

Hymenoptera

Chapter 12

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Abstract

We present the first review of Hymenoptera alien to Europe. Our study revealed that nearly 300 species of Hymenoptera belonging to 30 families have been introduced to Europe. In terms of alien species diversity within invertebrate orders, this result ranks Hymenoptera third following Coleoptera and Hemiptera. Two third of alien Hymenoptera are parasitoids or hyperparasitoids that were mostly introduced for biological control purposes. Only 35 phytophagous species, 47 predator species and 3 species of pollinators have been introduced. Six families of wasps (Aphelinidae, Encyrtidae, Eulophidae, Braconidae, Torymidae, Pteromalidae) represent together with ants (Formicidae) about 80% of the alien Hymenoptera introduced to Europe. The three most diverse families are Aphelinidae (60 species representing 32% of the Aphelinid European fauna), Encyrtidae (55) and Formicidae (42) while the Chalcidoidea together represents 2/3 of the total Hymenoptera species introduced to Europe. The first two families are associated with mealybugs, a group that also included numerous aliens to Europe. In addition, they are numerous cases of Hymenoptera introduced from one part of Europe to another, especially from continental Europe to British Islands. These introductions mostly concerned phytophagous or gall-maker species (76 %), less frequently parasitoids. The number of new records of alien Hymenoptera per year has shown an exponential increase during the last 200 years. The number of alien species introduced by year reached a maximum of 5 species per year between 1975 and 2000. North America provided the greatest part of the hymenopteran species

alien to Europe (96 species, 35.3%), followed by Asia (84 species, 30.9%) and Africa (49 species, 18%). Three Mediterranean countries (only continental parts) hosted the largest number of alien Hymenoptera: Italy (144 spp.), France (111 spp.) and Spain (90 spp.) but no correlation was found with the area of countries. Intentional introduction, mostly for biological control, has been the main pathway of introduction for Hymenoptera. Consequently, the most invaded habitats are agricultural and horticultural as well as greenhouses. To the contrary, Hymenoptera alien *in* Europe are mostly associated with woodland and forest habitats. Ecological and economic impacts of alien Hymenoptera have been poorly studied. Ants have probably displaced native species and this is also true for introduced parasitoids that are suspected to displace native parasitoids by competition, but reliable examples are still scarce. The cost of these impacts has never been estimated.

Keywords

Hymenoptera, alien, Europe, biological invasions

12.1. Introduction

Hymenoptera is one of the four large insect orders exceeding 100 000 species in the world, the other major orders being Coleoptera, Lepidoptera and Diptera (Gauld and Bolton 1988, Goulet and Huber 1993). The Hymenoptera order contains about 115 000 described species and authors estimated that there are between 300,000 and 3,000,000 species of Hymenoptera (Gaston 1991), possibly around 1,000,000 (Sharkey 2007). These estimates mean that only 1/10 has been described so far and 9/10 awaits description. However, the number of Hymenoptera species is difficult to estimate with accuracy, as most of the mega diverse regions of the world have not been extensively studied and inventoried regarding this group (LaSalle and Gauld 1993). In Europe, about 15,000 species have been reported belonging to 73 families, but undoubtedly thousands of species remains to be discovered and described. From our recent review of the literature, the alien species of Hymenoptera comprise 286 species belonging to 30 families. The order ranks third just following the Coleoptera and the Hemiptera in terms of alien species diversity (Roques et al. 2008). Additionally, 71 European species have been translocated from one part of Europe to another (adding 5 more families) and 11 species are considered cryptogenetic. All together within Europe, at least 368 Hymenoptera species have been introduced in different parts of the continent.

Hymenoptera have been traditionally subdivided into three assemblages (the paraphyletic sub-order Symphyta and the monophyletic Aculeata and Parasitica belonging to the sub-order Apocrita). Each group exhibits different biology. ‘Symphyta’ are mostly phytophagous and are the most primitive members of the order. Parasitica are mainly parasitic species but some of them have returned secondarily to phytophagy, while Aculeata encompass a larger spectrum (predators, pollinators, parasitoids); all eusocial hymenoptera belong to this last group.

Members of the Hymenoptera are familiar to a general audience and common names exist for a large variety of groups: “wasps”, “bees”, “ants”, “bumblebees”, “saw-

flies”, “parasitic wasps”. Hymenoptera adult sizes range from the very small Mymaridae (0.5 mm) to the large aculeate wasps (up to 5 cm long in Europe). This group of mandibulate insects is well defined by the combination of several characters: they have two pairs of functional wings (with the exception of apterous species) bearing fewer veins than most other insect groups and rarely more than seven cross veins. The abdominal tergum 1 is fused to the metanotum and in most Hymenoptera the metasoma (apparent gaster) is joined to the mesosoma (apparent thorax) by a petiole.

Hymenoptera have two main larval types. ‘Symphyta’ have larvae that are caterpillar-like, but true caterpillars (Lepidoptera) have at most four pairs of prolegs (abdominal segments 3–6) while sawflies larvae have at least five pairs of prolegs (abdominal segments 2–6). Furthermore the prolegs of Symphyta do not bear crochets, whereas those of Lepidoptera larvae do. ‘Apocrita’ have legless grub-like larvae that are nearly featureless unless they have a differentiated head (Goulet and Huber 1993). All Hymenoptera have haplodiploid sex determination (haploid males and diploid females). Arrhenotoky is the most common mode of reproduction in Hymenoptera (Heimpel and de Boer 2008). The males develop parthenogenetically from unfertilised eggs while the females develop from fertilised eggs. Females can control fertilisation by releasing sperm to an egg upon oviposition, and can thus adjust the sex-ratio of their progeny.

Ecologically and economically few groups of insects are as important to mankind as the Hymenoptera. Bees provide the vital ecosystem service of pollination in both natural and managed systems (Gallai et al. 2009) while parasitic Hymenoptera control populations of phytophagous insects (Tscharntke et al. 2007) and can be effective agents for control of pest insects (Bale et al. 2008, Brodeur and Boivin 2004, Jonsson et al. 2008). Some of the phytophagous hymenoptera have an intimate association with their host-plants (Nyman et al. 2006) and can also be considered as major pests to forests (e.g. Diprionidae) (De Somviele et al. 2004, Lyytikainen-Saarenmaa and Tomppo 2002). Ant invasions cause huge economic and ecological costs (Holway 2002, Lach and Thomas 2008) and Hymenoptera stings, specifically those of wasps, hornets and bees cause serious allergic reactions and anaphylaxis (Flabbee et al. 2008, Klotz et al. 2009).

12.2. Taxonomy of alien species

The 286 species of Hymenoptera alien to Europe belong to 30 different families (Table 12.1), which also have native representatives. Among these alien species, 35 species are phytophagous, 1 detritivorous, 3 pollinators, 47 predators whilst 200 are parasitoids or hyperparasitoids. These results show that only 13.3% of the alien wasp and bee species are phytophagous (including pollinators), the great majority of which (86.4 %) are predators and parasitoids (respectively 16.4% and 70.0%). Most parasitoids were intentionally introduced to control pests. Interestingly, among the 71 Hymenoptera that have been introduced from one part of Europe to another (aliens *in* Europe - Table 12.2), an opposite proportion is observed. Fifty-four species (76.0 %) are phytopha-

gous and only 17 (23.9%) are parasitic or predatory. These species have mostly followed their host plants throughout Europe.

Consequently, most alien Hymenoptera in Europe belong to the sub-order Parasitica (228 spp. and 20 families, 79.4% of the species), while Aculeata (51 spp. and 7 families, 17.8%) and Symphyta (8 spp. and 3 families, 2.8%) are less represented. Six families of wasps (Aphelinidae, Encyrtidae, Eulophidae, Braconidae, Torymidae, Pteromalidae) represent together with ants (Formicidae) about 80% of the alien Hymenoptera in Europe. Each of these families has more than 10 introduced species in Europe. The three most diverse families in terms of alien species are Aphelinidae (60 species), Encyrtidae (55) and Formicidae (42). By far the richest superfamily is the Chalcidoidea that includes 198 alien species (69.2% of the total alien Hymenoptera). Below we give a short synopsis for all Hymenoptera families containing introduced species to Europe (including cryptogenic and translocated species).

Suborder Symphyta

Argidae. The second largest family of ‘Symphyta’ with about 1000 species described, but only 60 in Europe. Alien species to Europe have not yet been found. One species only, *Arge berberidis*, is considered as introduced from one part of Europe to another. Females deposit eggs in leaves of various angiosperms and the larvae are phytophagous, feeding mostly on woody plants (Salicaceae, Rosaceae, Betulaceae).

Blasticotomidae. This is a very small family represented by one species only, *Blasticotoma filiceti*, in northern and central Europe. Larvae are stem borers, developing within the rachis of ferns (e.g., *Athyrium filix-femina* (L.) Roth) (Schedl 1974). *B. filiceti* has been infrequently introduced into Great Britain from continental Europe, mostly with horticultural plants.

Diprionidae. A small family of ‘Symphyta’ that mostly occurs in northern Europe. It comprises about 100 species in the northern hemisphere, of which 20 occur in Europe. The larvae attack softwood trees (e.g. conifers) and are considered as major pests in forestry. Diprioninae develop on Pinaceae and Monoxeninae on Cupressaceae, but only the first subfamily contains invaders. Alien species have not yet been recorded. However, five species are considered as alien in Europe. *Neodiprion sertifer* and *Gilpinia hercyniae* cause severe damage to pine and spruce plantations. Females of some species produce pheromones that attract males. The larvae consume needles, sometimes gregariously, and when mature drop to the ground, pupate and overwinter within a cocoon (rarely upon trees). Diapause can last for more than one winter (Pschorn Walcher 1991), the wasps emerging and dispersing in the early spring.

Pamphiliidae. A small holarctic family containing about 60 species in Europe (van Achterberg and van Aartsen 1986, Viitasaari 2002). Only *Cephalcia alashanica* is an alien species introduced from temperate Asia. Six other species are alien in Europe, most of them having been introduced from the Alps to northern countries with their host trees. Some species attack conifers and are considered as forest pests. Females lay eggs

in a slit cut in a needle, the normally gregarious larvae either spin silk webs in which they develop (Cephalciinae) or roll the host plant leaves (Pamphiliinae). They overwinter as pupae within pupal chambers in the soil and adults emerge in early spring.

Siricidae. A small Holarctic family (16 European species) of large and conspicuous wasps (woodwasps). Nine species are considered as alien in Europe, with only 5 alien species introduced from North America with imported timbers. The family is subdivided into two subfamilies, the Siricinae attacking conifers and the Tremecinae that attack angiosperm trees. The females, which do not feed, oviposit in recently fallen or dying trees and introduce spores of symbiotic fungus along with the eggs. The larvae develop in 2 or 4 years as woodborers and pupate in the bark.

Tenthredinidae. This cosmopolitan family is the most diverse group of 'Symphyta' including 1050 species in Europe of which only two are alien to Europe, *Nematus* (*Pteronidea*) *tibialis* (a pest of black locust) and *Pachynematus* (*Larinematus*) *itoi* (a larch pest) and 23 alien in Europe. Some native European species are also considered serious pests in North America where they have been introduced. All species are phytophagous and the larvae are mostly external feeders on diverse species of angiosperms and conifers. The females embed their eggs in the tissue of the plant, using their ovipositor as a saw. The larvae feed singly on leaves, or are stem borers, gall makers or leaf miners. Tenthredinidae mostly overwinter as prepupae in the ground, sometimes as mature larvae or eggs, the adults emerge relatively early in the spring.

Suborder Apocrita Parasitica

Chalcidoidea

Agaonidae. A small-sized family with only 6 species of wasps reported in Europe, four of which are introduced from tropical Asia, along with two ornamental trees *Ficus microcarpa* L.f. and *F. religiosa* L. Agaonidae are the pollinators of fig trees and are mutualistically associated with their host plant. Several groups of non-pollinating fig wasps are associated with figs, either as gall-makers,inquilines or parasitoids. Their taxonomic position has been discussed and they are here grouped within Agaonidae for convenience (Bouček 1988, Rasplus et al. 1998).

Aphelinidae. This is a moderately sized family of wasps represented in Europe by less than 200 species of which sixty are aliens. Aphelinidae species have been introduced from diverse geographic areas as biological control agents. Along with encyrtid, the Aphelinidae is the most important family for biological control. Species are primarily endoparasitoids or ectoparasitoids, sometimes hyperparasitoids, of sternorrhynchous Hemiptera (mostly Aphidoidea, Coccoidea or Aleyrodoidea). Some species may have complicated ontogeny (Hunter and Woolley 2001) and males and females may attack different hosts either as parasitoids or hyperparasitoids.

Chalcididae. A small family of chalcid wasps comprising about 80 species in Europe, including one alien species, introduced from North Africa to control fruit flies.

The hosts of these obligate parasitoids or hyperparasitoids are mostly Lepidoptera and Diptera, less frequently Coleoptera, Neuroptera or Hymenoptera (Delvare 1995, Delvare 2006). The females lay eggs within the host larva and the pupation take place in the host pupa.

Encyrtidae. A large family of wasps represented by more than 700 species in Europe (Trjapitzin 1989), of which 55 are considered to be alien, introduced from different parts of the world for biological control of economically important pests (Noyes and Hayat 1994). Most of the Encyrtidae are endoparasitoids of scale insects. Some species also develop as endoparasitoids of other insect orders, mostly Lepidoptera, Coleoptera and Hymenoptera). The egg is laid inside the host and the larva develop as a parasitoid sometimes as an hyperparasitoid, and pupates within the host.

Eulophidae. A large family of wasps that contains 1100 species in Europe (Gauld and Bolton 1988), including 29 alien species. Most alien species have been introduced for biological control but a few (3) are gall makers that develop at the expense of plant tissue of *Eucalyptus* (Branco et al. 2009). Eulophid are primarily solitary parasitoids of eggs, pupae or larvae of various endophagous insects (Diptera, Coleoptera, Thysanoptera, Lepidoptera or Hymenoptera). Some species attack economically important leaf miners or gall makers (e.g. Agromyzidae, Cecidomyiidae).

Eupelmidae. A small family represented by about 100 native (Gibson 1995) and 5 alien species in Europe (*Eupelmus* and *Anastatus* spp.). Eupelmidae are primarily ectoparasitoids (idiobionts) of egg or larval stages of various insects and spiders (Askew et al. 2000). Some species within this family are generalist parasitoids.

Eurytomidae. A medium-sized family with about 300 species in Europe (Zeroova 1978), of which seven are alien. Interestingly, these alien species are not parasitoids but phytophagous and pests of crops or horticultural plants whilst most eurytomids are primarily ectoparasitoids or hyperparasitoids of extremely diverse groups of endophagous insects (Lotfalizadeh et al. 2007). Phytophagous species are either stem-borers or seed-feeders or gall-makers on different host-plant groups (e.g. Graminaceae, Leguminosae). Some species are both entomophagous then phytophagous during their larval development.

Mymaridae. A medium-sized family including about 450 species in Europe, of which only two are alien, *Anaphes nitens* and *Polynema striaticorne*. All mymarids are internal, solitary (rarely gregarious) parasitoids of the eggs of various insects (Huber 1986). The most common hosts are eggs of Hemiptera Auchenorrhyncha (Cicallidae, Cixiidae) but mymarids also parasitize eggs of other insects (Coleoptera, Hemiptera). Female oviposit within concealed eggs, and there are 2 to 4 larval stages.

Perilampidae. A small family of chalcid wasps that includes 40 European species. The only alien species in this family (*Steffanolampus*) originates from North America and is a parasitoid of wood-boring Coleoptera. Most perilampids are hyperparasitoids of Lepidoptera through Tachinidae (Diptera) or Ichneumonoidea (Steffan 1952). Females deposit their eggs away from the host, however the young larvae (planidium) are mobile, and may either attach themselves to the primary host, at any stage of larval development, or enter the host to attach to its endopara-

sitoids. In some species, an adult host carries the larva to a suitable location where host larvae occur (Darling 1999).

Pteromalidae. A large, paraphyletic family including more than 1100 species in Europe (Graham 1969). Only ten are considered alien species, most of which were unintentionally introduced with their hosts, some (3) for biological control purposes. The diversity of the group is reflected by the diversity of the biology exhibited. Pteromalids are mostly ectoparasitoid *idiobionts*, but some species are *koinobionts*. Miscogasterinae are larvo-pupal endoparasitoids of dipteran leaf miners. Eunotinae (e.g. *Moranila*) are predators on Coccoidea eggs within the female body (Boucek and Rasplus 1991).

Signiphoridae. A small family of tiny chalcids (0.5–2 mm) comprising only 8 European species, one of which is an introduced hyperparasitoid (*Chartocerus*) (Woolley 1988). Signiphoridae are known as parasitoids (sometimes hyperparasitoids) of cyclorhaphous dipterans, scale-insects (Coccoidea) or white-flies (Aleyrodidae).

Torymidae. A medium-sized family that includes about 350 European species (Grissell 1995, Grissell 1999), of which 13 are considered as alien to Europe. Most of the alien species (12) belong to the genus *Megastigmus* and are considered pest of conifer seeds (Roques and Skrzypczynska 2003). Most torymines are idiobiont ectoparasitoids of gall-makers (Cynipidae and Cecidomyiidae) and other endophytic insects but most Megastigminae are specialist phytophages. *Megastigmus* females lay their eggs in the ovules of conifers before fertilization has taken place (Roques and Skrzypczynska 2003) (Figure 12.9). *Megastigmus* biological habits have been shown to be particularly prone to invasion. Since most of their development takes place within seed, their presence is usually overlooked in traded seed lots, the infested seeds showing up only when X-rayed (Figure 12.10). In addition, insect are able to become dormant during the larval stage, for up to 5 years (prolonged diapause) following the annual size variations of the seed crop, thus broadening the chances that adult emergence will occur under favourable circumstances near a suitable new host. Moreover, some species such as the Douglas-fir seed chalcid, *M. spermotrophus*, appear capable of preventing the abortion of unfertilized seeds. The invasive insect larva may thus achieve its development in unpollinated, unfertilized seeds by altering the physiology of the ovule so that it allocates *de novo* resources to the larva (von Aderkas et al. 2005).

Trichogrammatidae. A moderately-sized family containing about 150 European species. The nine alien species belong mostly to three genera: *Trichogramma*, *Oligosota*, *Uscana* and have been introduced to Europe for the control of agricultural pests (Lepidoptera and Coleoptera) (Pintureau 2008). Trichogrammatids are primarily solitary or gregarious endoparasitoids of insect eggs (mostly Lepidoptera, Hemiptera, Coleoptera) and can sometimes develop as hyperparasitoids.

Ichneumonoidea

Ichneumonidae. This is the first megadiverse Apocrita family in Europe with about 5500 species, six of them are considered as alien to Europe. These species have been in-

tentionally introduced for biological control. The family is divided into more than 30 subfamilies. Consequently, the biology of ichneumonids is extremely diverse. Ichneumonids mostly parasitize the immature stages of the Holometabola, and are frequently associated with Lepidoptera and sawflies (Hymenoptera). Ectoparasitism is considered the primitive condition and endoparasitism has evolved several times independently within the family.

Braconidae. Braconids represent the second megadiverse family with nearly 3500 European species, 16 of which are considered as alien. Altogether, Ichneumonoidea may account for nearly 10000 species in Europe. Like ichneumonids, braconids exhibit a large range of biological characteristics. They are mostly parasitoids of other insects. Some of the braconid groups are larvo-nymphal *koinobiont* parasitoids; others are *idiobiont* ectoparasitoids. Introduced species are mostly *koinobiont* endoparasitoids and are associated with aphids (Aphidiinae), moths (Miscogasterinae), and fruit flies (Opiinae).

Ceraphronoidea

Ceraphronidae. A small family represented by 100 European species, only one of which is considered as alien, *Aphanogmus bicolor*. Their biology is poorly known but some species are endoparasitoids of nematocerous dipterans whilst others attack Thysanoptera or Neuroptera. Some species are considered as antagonists of biological control agents since they are parasitoids of predaceous midges or hymenopteran primary parasitoids.

Cynipoidea

Cynipidae. A medium-sized family confined to the Holarctic and containing 350 European species. Only the chesnut gall wasp, *Dryocosmus kuriphilus*, is alien to Europe (Figure 10.8). Six more species, mostly from the genus *Andricus*, are considered as aliens in Europe. Most Cynipinae are gall inducers on *Quercus*, *Rosa* and some Compositae but others (Synergini) areinquilines.

Figitidae. This medium-sized family contains ca. 400 species in Europe, the family as presently understood includes the previous Eucoilidae, Charipidae and Anacharitidae (Ronquist 1995). Only one species (*Aganaspis daci*) is considered as alien and has been introduced to Europe for the control of fruitflies. Figitid larvae develop as internal parasitoids of other endophytic insect larvae. The hosts are mostly dipteran larvae but Charipinae Alloxystini are hyperparasitoids of aphids through Braconidae Aphidiinae and Aphelinidae. The egg is deposited inside a young host larva, which continues to develop normally (*koinobionts*), the parasitoid larvae emerges before the host death and can achieve its development as an ectoparasitoid.

Platygastroidea

Platygastridae. A medium-sized family with about 500 species in Europe but only two (*Amitus* spp.) are considered as alien, having been introduced into Europe for the control of whiteflies. Many Platygastridae are endoparasitoids of gall-making dipterans whilst others attack immature hemipterans or ant larvae. The biology of most species remains largely unknown. Some species are *thelytokous* and very few polyembryonic. The larvae have an uncommon appearance and superficially resemble cyclopoid copepods.

Scelionidae. A medium-sized family that includes about 600 species in Europe, three of them considered as alien. Scelionids are primarily endoparasitoids in a wide variety of insect eggs (few on other arthropods), more rarely hyperparasitoids. Introduced species attack Hemiptera or Lepidoptera eggs and have been used for pest control. The family has been synonymized with Platygastridae but we still keep it apart for consistency (Murphy et al. 2007).

Suborder Apocrita Aculeata

Chrysidoidea

Bethylidae. A medium-sized family represented by about 230 species in Europe. Four species are considered alien. *Cephalonomia waterstoni*, *Holepyris sylvanidis* and *Plastanoxus laevis* are cosmopolitan. They were introduced into Europe with stored products. *Laelius utilis* is a parasitoid of *Anthrenus*. Bethyidae mainly attack larvae of Lepidoptera and Coleoptera. The female stings and paralyzes the host, and then lays several eggs on its skin. Larvae develop as ectoparasitoids. For a few species, females tend the eggs and developing larvae. Pupation occurs next to the host remains.

Chrysididae. A medium-sized family that comprises 420 European species. Cuckoo-wasps are parasitoids or kleptoparasitoids of Aculeate wasps. The nests of the host are sought out by the female chrysid that oviposits into the host cells. A true parasitoid larva develops as an ectoparasitoid on the host larva whilst a kleptoparasite larva kills the egg or the young larva of the host before consuming the stored food. One East European species introduced in western parts of Europe, *Chrysis marginata*, is considered as alien in Europe (Pagliano et al. 2000).

Dryinidae. A medium-sized family that comprises about 100 species in Europe. All dryinids are parasitoids of immature and adult Hemiptera Auchenorrhyncha. The larva is rather endoparasitoid than ectoparasitoid during the last instars, forming a bag (*thylacium*) constituted by the exuviae of the parasitoid and bulging from the host abdomen. Only one species alien to Europe, *Neodryinus typhlocybae*, was introduced in northern Italy and subsequently in France for biological control of the Nearctic planthopper *Metcalfa pruinosa* (Hemiptera, Flatidae) (Malausa et al. 2003, Malausa et al. 2008).

Apoidea

Apoidea represents a superfamily including more than 2000 species in Europe. Depending on the classification used, the group comprises seven families (ancient subfamilies of the single family Apidae) to eleven families if sphecids wasps, the sister group of bees, are included (Sharkey 2007). Here we followed the more recent classification system and adopted a subdivision into several families. Bees are flower visitors and efficient pollinators of angiosperms. Their larvae are phytophagous and develop on a mixture of pollen and nectars. Bees are now recognized as an important group of ecosystem engineers that modulate resources availability (i.e. plants) to other organisms (Jones et al. 1994). Two families of bees contain alien species in Europe. Sphecids wasps comprise 4 families of wasps that feed their progeny with a wide range of preys (mainly insects or spiders), depending on genera. All alien species belong to the family Sphecidae.

Apidae. This small family of *eusocial* bees includes social species, with colonies attaining large sizes. It comprises less than 70 species in Europe, all except one (*Apis mellifera*) belonging to the genus *Bombus*. Some of these pollinator species have been introduced from some parts of Europe into other European regions for crop pollination purposes and honey production.

Megachilidae. This family comprises about 480 species in Europe, two are considered as alien. The alfalfa leafcutter bee, *Megachile rotundata*, is a west European species that has been used commercially for pollination of alfalfa, and introduced in Russia. *Osmia cornifrons* is an alien species that has been introduced from Japan into Denmark for pollination of fruit trees. Megachilidae nest in burrows in soil or in pithy stems. A few species build stony mud nests. Cells of Megachilidae are made of foreign materials (leaf pieces for *Megachile* species) brought into the nest.

Sphecidae. This family in its narrow sense comprises about 70 species, four of which are alien species accidentally introduced into Western Europe from North America (*Sceliphron caementarium* and *Isodontia mexicana*) or from Asia (*S. curvatum* and *S. deformis*). Adults of most species (e.g., *Isodontia*) prey on orthopteroids but some of them, such as *Sceliphron* spp., catch Araneae. While *S. deformis* has possibly not established in the Balkans, both other species became established and threaten autochthonous species of *Sceliphron* (Cetkovic et al. 2004). While *Isodontia* puts its preys in pre-existing cavities, *Sceliphron* are mud-daubers that often built their nests in or around buildings (Bitsch and Barbier 2006, Bitsch et al. 1997).

Vespoidea

Formicidae. This family includes about 650 species in Europe, 42 of which are alien to Europe, one is cryptogenetic and seven are European species introduced into other areas of Europe. Ants exhibit a remarkable range of life histories. They have colonized most habitats and form colonies of variable sizes in the soil, plant debris, trees and infrastructures of human origin. The nest contains one to several reproductive females as well as workers and broods. Males are produced seasonally. Mating usually takes

place outside the nest but may occur inside the nest. In Europe, the argentine ant *Linepithema humile* (Mayr) is extremely abundant throughout the Mediterranean basin, causing economic damage by fostering some hemipteran pests and upsetting the action of natural enemies; However, it may occasionally act as a beneficial natural enemy in forest ecosystems (Way et al. 1997).

Vespididae. This medium-sized family comprises 300 species in Europe classified into four subfamilies: Masarinae, Eumeninae, Polistinae and Vespinae (22 species). Vespinae are social wasps that built aerial or subterranean nests made of carton and composed of several combs protected by an envelope. Recently, a hornet species alien to Europe, *Vespa velutina nigrithorax*, was accidentally introduced from Asia into southern France (Haxaire et al. 2006, Villemant et al. 2006) (Figure 10.11). The European yellowjackets, *Vespula germanica* (Fabricius, 1793) and *V. vulgaris* (Linné, 1758) were introduced to Iceland from continental Europe, the last into Feroe Islands (Olafsson 1979).

For nine families the number of alien species exceeds 5% of the species known in Europe (Figure 12.1). Four of these families are small (Agaonidae, Signiphoridae, Siricidae and Sphecidae) and consequently the number of alien species is marginal. However Aphelinidae, Encyrtidae, Trichogrammatidae and Formicidae are medium-sized families comprising between 150 and 700 species and consequently the number of alien taxa is relatively important. Interestingly, the number of alien Aphelinids introduced into Europe for biological control represents about one third of the specific diversity of the family in Europe. Aphelinidae, Encyrtidae and Trichogrammatidae, three families largely used for biological control, rank among the top five in terms of proportion of alien species in the European fauna. Aphelinidae and Encyrtidae are mostly biological control agents of the three mealybug families that include most of the pest species alien to Europe (Diaspididae, Pseudococcidae and Coccidae; see Chapter 9.3). Finally, Formicidae also include a large proportion of alien species to Europe and represent a major group of alien species to Europe.

12.3. Temporal trends

First records in Europe are known for 262 of the 286 hymenopteran species alien to Europe (92%). Dates given here are relatively imprecise, as most species may have been introduced two to five years before they were reported. Furthermore, we did not try to check all literature and collections in order to report the dates of first interception within Europe.

The number of new records per time period shows an exponential increase in the number of alien Hymenoptera to Europe during the last 200 years (Figure 12.2). The mean number of new records of alien hymenoptera varies from less than one species per year during the period (1800–1924) to about 5 species per year between 1975 and 2000. Interestingly, we observed a decrease in the number of Hymenoptera reported during the last 10 years. This overall increase in the number of introduced species also corresponded to an increase in the number of hymenopteran families newly found in Europe.

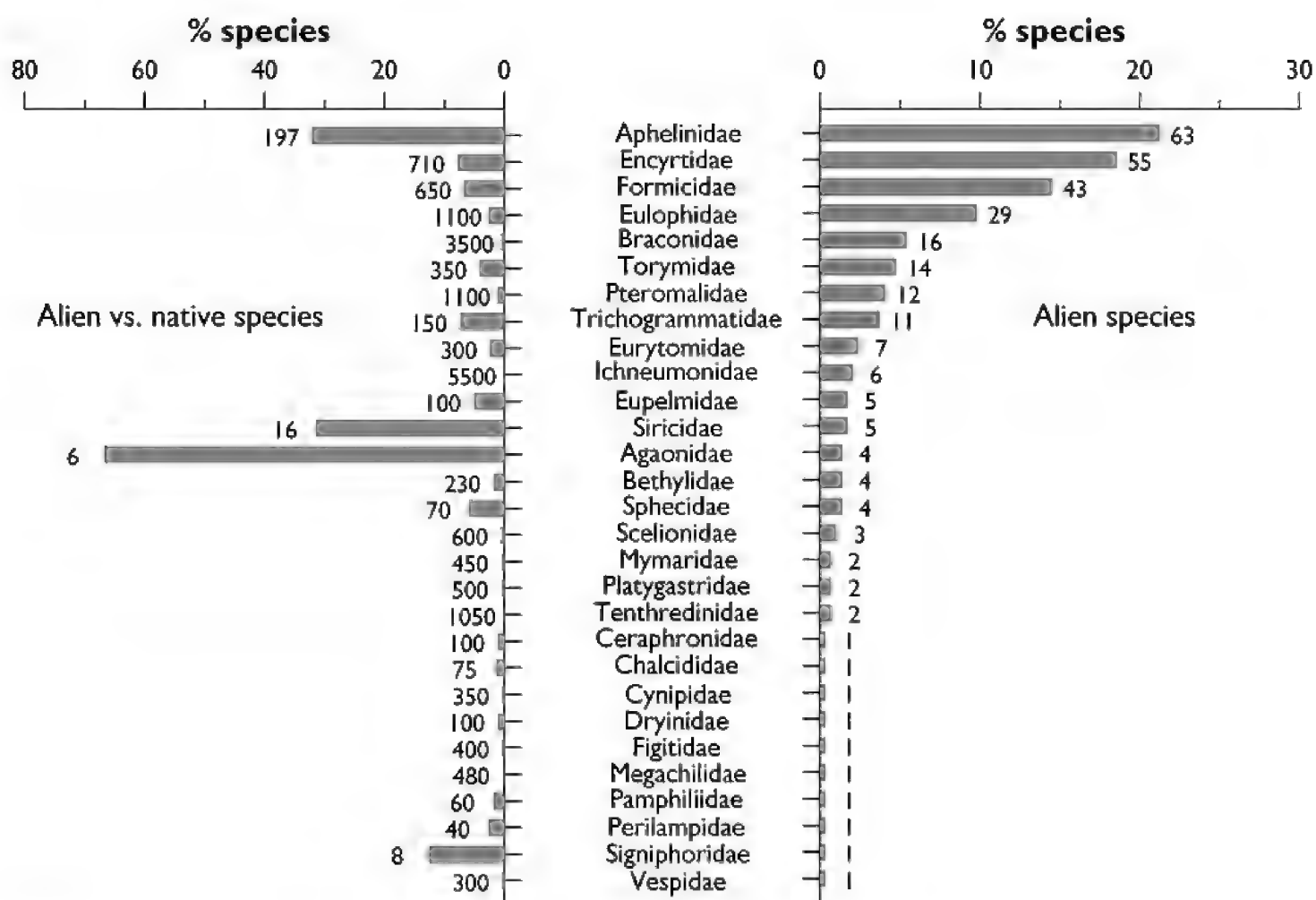


Figure 12.1. Taxonomic overview of the alien Hymenoptera. Right- Relative importance of the hymenopteran families in the alien entomofauna. Families are presented in a decreasing order based on the number of alien species. Species alien to Europe include cryptogenic species. The number over each bar indicates the number of alien species observed per family. Left- Percentage of aliens vs. total species in each Hymenoptera family in Europe. The number over each bar indicates the total number of species observed per family in Europe.

From 1800 to 1924 (125 years) only 35 species, representing 8 families, of alien hymenoptera were reported in Europe. Most of them are biological control agents or ants. Only one species of chalcid wasp (furthermore a hyperparasitoid) is reported from that period while Chalcidoidea is the most diverse group of alien Hymenoptera. However, during that period of time the European fauna was still poorly known and little studied (which is still the case for the majority of families) and the number of alien species is likely to have been underestimated. Nevertheless, over 1/3 of the alien ant species presently known in Europe were introduced between 1847 and 1929.

About 79% of the alien Hymenoptera were introduced in Europe in the last 60 years. During that period of time, 61.5% of the phytophagous alien and only 38.3% of the predator alien were introduced into Europe. Among the three most diverse families of alien Hymenoptera (namely Formicidae, Aphelinidae and Encyrtidae), Formicidae exhibited a relatively stable pattern, regarding the number of introductions per year over time, varying between 0.08 and 0.36, with a maximum of introductions during the periods 1925–1949 and 1975–1999 (Figure 12. 3). Aphelinids and encyrtids both show a relatively similar pattern, but somewhat different to the pattern exhibited by ants. These two families, largely used in biological control, showed a peak of introduc-

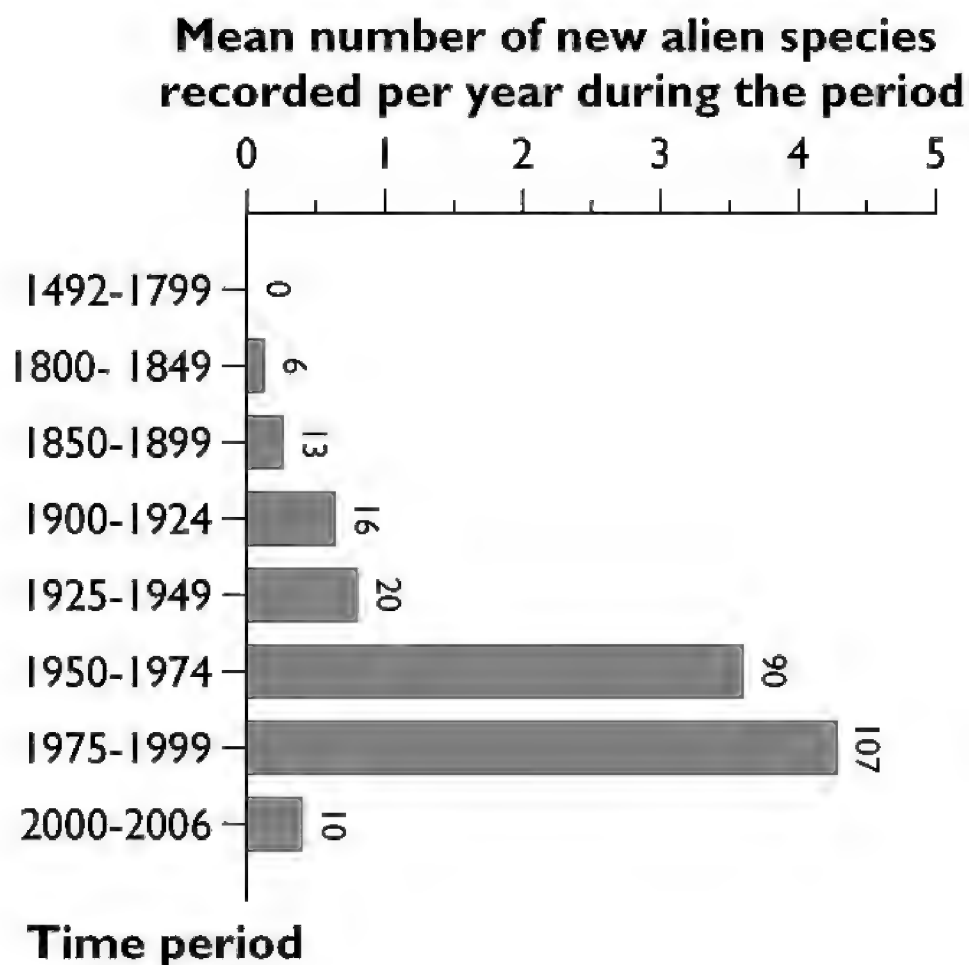


Figure 12.2. Temporal trend in number of alien Hymenoptera to Europe per period of 25 years from 1492 to 2006. Cryptogenic species excluded. The number above the bar indicates the number of species introduced.

tions during the period 1950–1999 (between 0.52 and 1.32 species per year), which roughly corresponds to the ‘golden years’ of biological control. More specifically, our analysis showed that 77.5% of the total number of parasitoids alien to Europe were introduced between 1950 and 1999. In the last 10 years, the rate of introduction drops to less than 0.1 species per year. This trend is probably due to both the decreasing interest in research on biological control and to the growing concern over possible nontarget effects of biological control.

12.4. Biogeographic patterns

Origin of alien species

We could ascertain a region of origin for 272 (95.1%) alien wasp species introduced to Europe. Overall there are no major difficulties in identifying the areas of origin of these wasps. The distribution of the genera of the hosts or the plant-hosts and also the origin of the taxonomists describing these species provide evidence of likely origins. However, for subsequent spread within Europe it is difficult, without genetic analyses, to separate spreading from adjacent countries from independent colonization events.

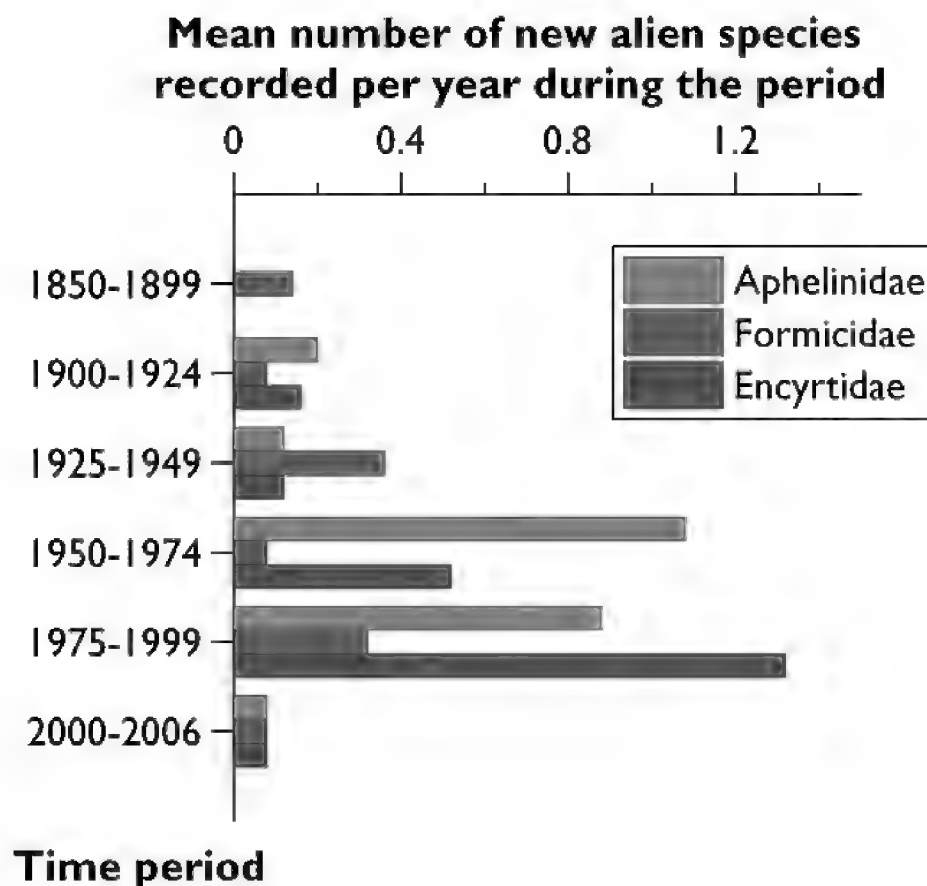


Figure 12.3. Rates of introduction of the three most diverse families of invasive Hymenoptera during the two last centuries.

North America provided the greatest part of alien Hymenoptera occurring in Europe (96 species, 35.3%), followed by Asia (84, 30.9%) and Africa (49, 18%) (Figure 12.4). This pattern is similar to the one found for Diptera (see Chapter 10) but differs from that observed in most other insect groups. Whatever the main areas of origin, trends of introduction are similar over time, and there is no evidence of a change in the origin of alien species through time (Figure 12.5). The only difference seemed to be a decrease of the afro-tropical species in the last 30 years, whereas rates of introduction still increased for both North America and Asia. However it must be noted that origins of alien species can differ from one country to another and general trends are not supported in all countries. Israel for example received more species from Asia and Africa than from North America (Roll et al. 2007).

Interestingly, the composition of the introduced guilds originating from different continents differed taxonomically. The alien guilds introduced from North America contains several phytophagous species (Siricidae, Torymidae, Eurytomidae) and several species of Ichneumonidea that are absent from oriental invader guilds. Overall, phytophagous aliens mostly originate from North America and temperate Asia. This is the case for xylophagous Siricidae, most *Megastigmus* seed-feeders (Torymidae), several Eurytomid species. Introduced plants (e.g. *Ficus* and *Eucalyptus*) came into Europe with species of their phytophagous guilds (Agaonid and Eulophidae gall-makers). Alien Formicidae originates from Africa (10 species), Asia (14) and South America (7) while only two were introduced from North America. South American ants mostly originated from areas with Mediterranean-like climate. Parasitoid wasps originated from all continents with no particular trends.

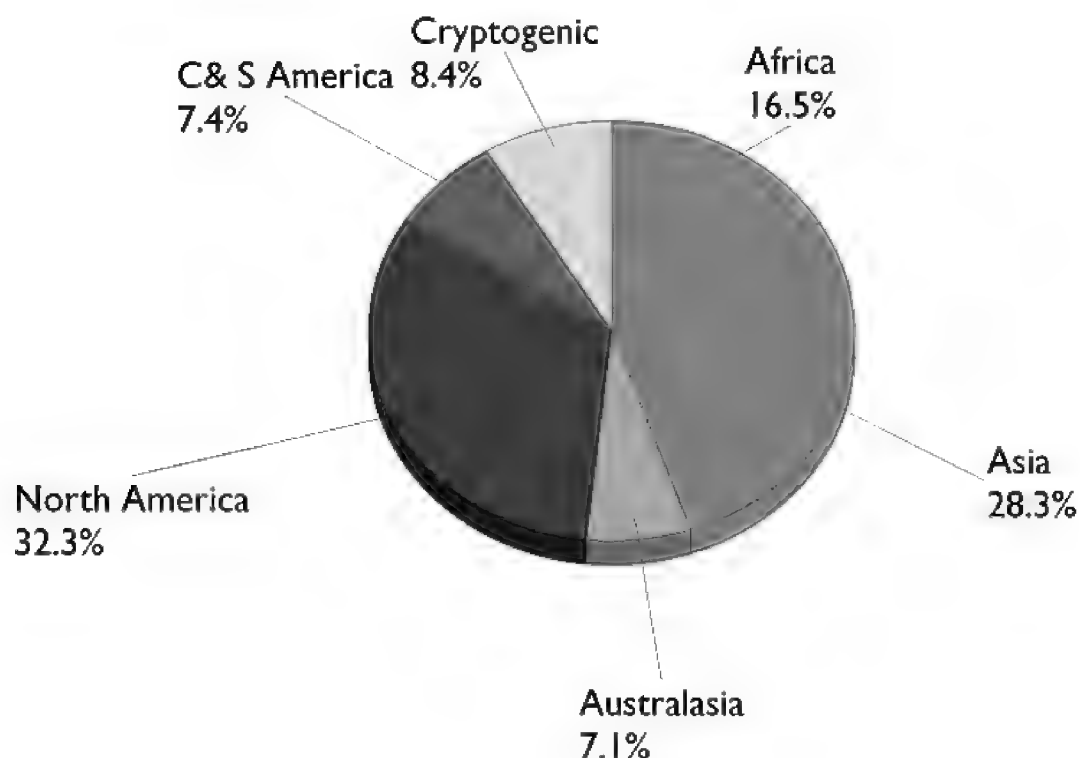


Figure 12.4. Origin of the 286 alien species of Hymenoptera established in Europe.

Distribution of alien species in Europe

Alien Hymenoptera species and families are not evenly distributed throughout Europe and large differences exist between countries (Figure 12.6, Table 12.3). However, results might have been influenced by large variations in the number of taxonomists involved, as well as by the intensity of the studies and of the samplings conducted in different regions. Little information is available for some countries of central and north-eastern Europe and consequently these areas appear to host comparatively few alien species of Hymenoptera.

Continental Italy hosts the largest number of alien Hymenoptera (144 spp.), followed by continental France (111 spp.) and continental Spain (90 spp.). Bosnia, Andorra and Latvia are the countries from which the lowest number of invasive Hymenoptera has been reported so far, with only one alien species. No correlation with the country surface area has been found but there is a latitudinal trend of decreasing number of alien species to Europe from southern to northern Europe.

As most of the alien hymenopterans are biological control agents, they were mostly introduced in one or few countries by national research projects that attempted to control target pest. Large-scale European projects for biological control are rare and consequently wasps have been introduced on a local scale.

About 150 alien species (i.e., more than 50% of the total species) have been reported from only one or two countries. In contrast, 31 species are reported from at least 10 countries, among them 13 of the 36 species were introduced before 1924. These aliens mostly belong to the three diverse families of alien Hymenoptera (namely Aphelinidae, Encyrtidae and Formicidae). Most of these widespread alien wasps were parasitoids introduced for biological control. For example, *Aphelinus mali* against the woolly apple aphid, *Eriosoma lanigerum* (Hausmann); *Aphidius colemani* and *A. smithi* as generalist

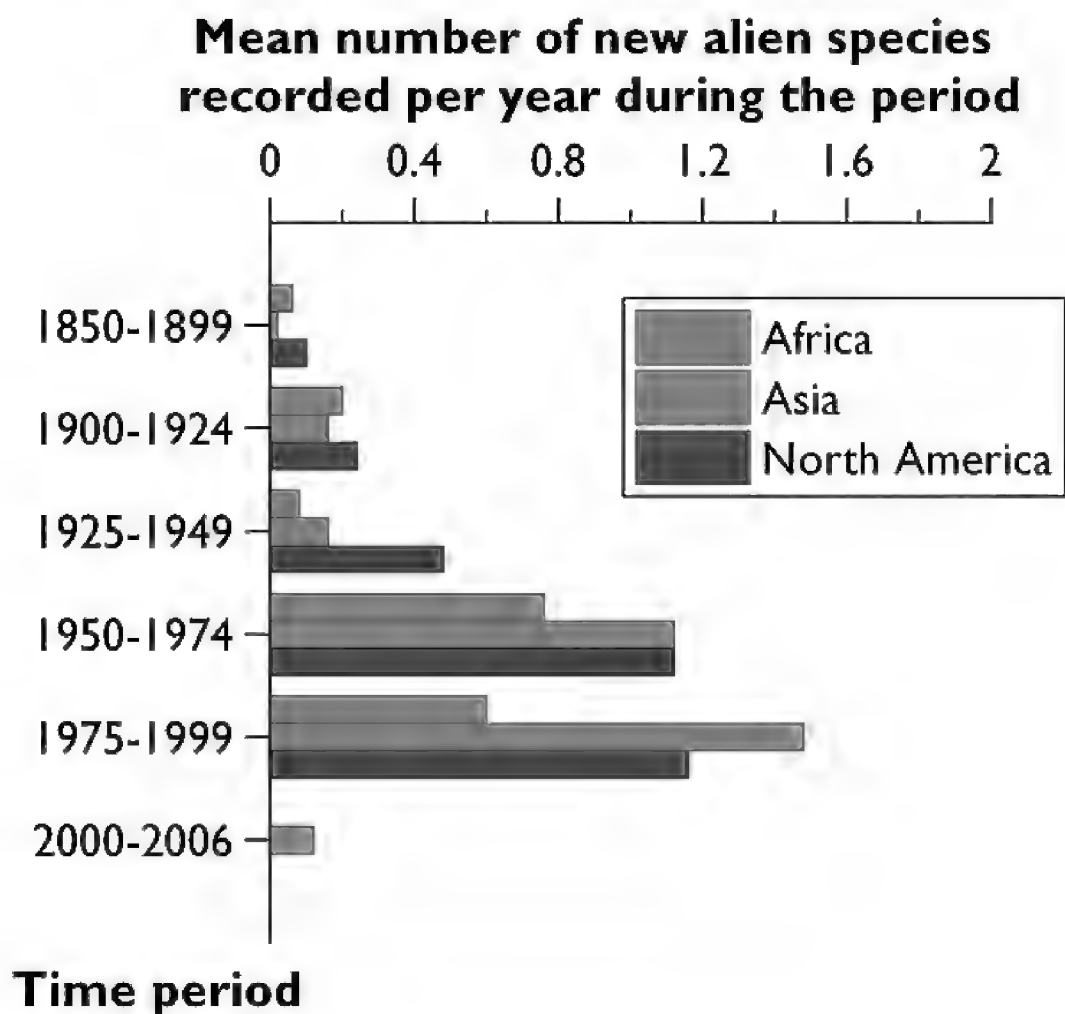


Figure 12.5. Evolution of the rate of alien Hymenoptera from different origin through time.

parasitoids used against several species of pest aphids, i.e., *Acyrtosiphon pisum* (Harris), *Aphis gossypii* Glover and *Myzus persicae* (Sulzer); *Cales noacki* against the aleyrodid *Aleurothrixus floccosus* (Maskell), a pest on *Citrus*; *Encarsia formosa* mostly as a biological control agent of greenhouse whitefly, *Trialeurodes vaporariorum* (Westwood); *Leptomastix dactylopii* Howard against *Planococcus citri* (Risso); *Aphytis mytilaspidis* as a parasitoid of the oystershell scale, *Lepidosaphes ulmi* (L.), and some other diaspidid scales; *Eretmocerus eremicus* as a parasitoid of the *Bemisia* complex (Hemiptera, Aleyrodidae) in the native range; and, *Mesopolobus spermotrophus* against the seed chalcid pest *Megastigmus spermotrophus*.

Only three of the widespread alien Hymenoptera are phytophagous and were introduced during the 19th century (*Megastigmus spermotrophus*, *Nematus tibialis*, *Sirex cyaneus*). Seven species of Formicidae appear widely distributed in Europe: *Hypoponera punctatissima* (31 countries), *Lasius neglectus* (10), *L. turcicus* (15), *Linepithema humile* (17), *Monomorium pharaonis* (23), *Paratrechina longicornis* (13), *Pheidole megacephala* (14)

12.5. Main pathways to Europe

Intentional introductions represent a large proportion of the introduced species in Europe (180 of 286, 63%) and this is mostly due to the high number of introduced

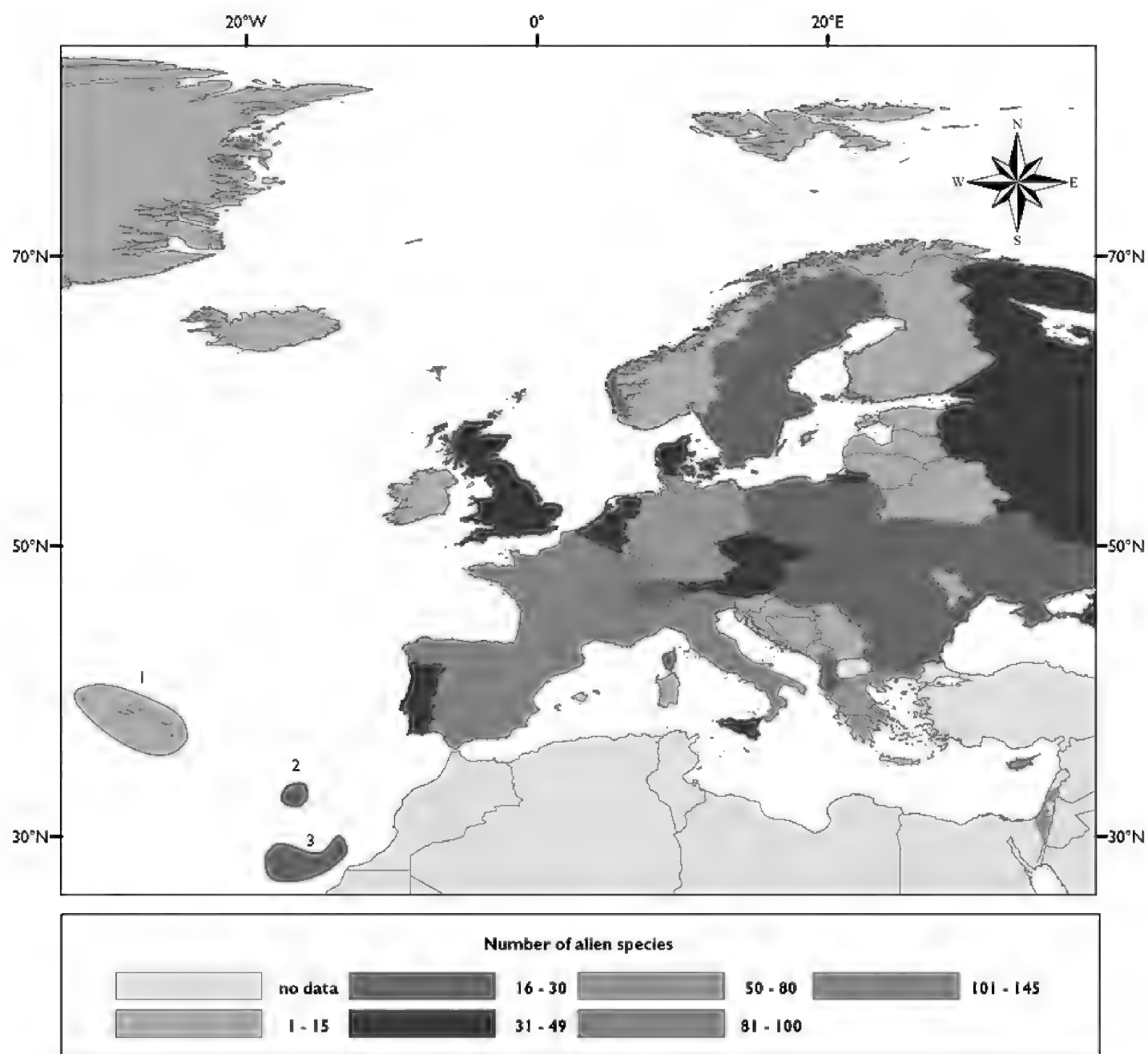


Figure 12.6. Colonization of continental European countries and main European islands by hymenopteran species alien to Europe. Archipelagos: **1** Azores **2** Madeira **3** Canary Islands.

biological control agents. Among the 106 species clearly accidentally introduced in Europe, 32 (30.1%) are phytophagous species, only 24 (22.6%) parasitoids or hyperparasitoids that were sometimes unintentionally introduced with their parasitic hosts although the real status of some of these parasitoids is difficult to ascertain, while the majority (47 species; i.e., 44.3%), are social Hymenoptera and Sphecidae.

Several species are cryptogenic and represent ancient introductions in Europe, mostly with stored products. Identifying the origin of accidental introductions is not easy but clearly introductions of plants for planting (e.g. cultivated conifers, ornamental trees) and plant seeds appeared to be the main pathways of introduction for phytophagous Hymenoptera. Thus, the lack of regulatory measures for seed imports in Europe probably resulted in the repeated establishment of alien species of *Megastigmus* seed chalcids since the beginning of the 20th century. Aliens presently represent 43% of the total fauna of tree seed chalcids in Europe (Roques and Skrzypczynska 2003). The development of trade in plant material through the Internet is likely to increase

this process because there is less control, especially for tree seeds which can be moved quite freely all over the world.

12.6. Most invaded ecosystems and habitats

Most of the habitats colonized by Hymenoptera alien *to* Europe correspond to habitats strongly modified by humans (Figure 12.7). About half of the species occur in agricultural and horticultural habitats and this proportion reaches 2/3 of the species if greenhouses are considered. Only 20% of the aliens to Europe occur in woodland and forest habitats. However, the proportion is reversed if we consider Hymenoptera alien *in* Europe; in this case, half of the translocated species are phytophagous pests of trees.

12.7. Ecological and economic impact

The ecological impacts of alien invertebrate species have been recently reviewed by Kenis et al. (2009) and Hymenoptera represent well all impact categories described in this review. Biological control programmes against pests, using introduced parasitoids, were initiated in Europe about 100 years ago. These programs using relatively host-specific parasitoids are long supposed to decrease the risk to nontarget species, however there is increasing concern about the ecological costs of biological control (Louda et al. 2003, Simberloff and Stiling 1996). All introduced natural enemies present a certain

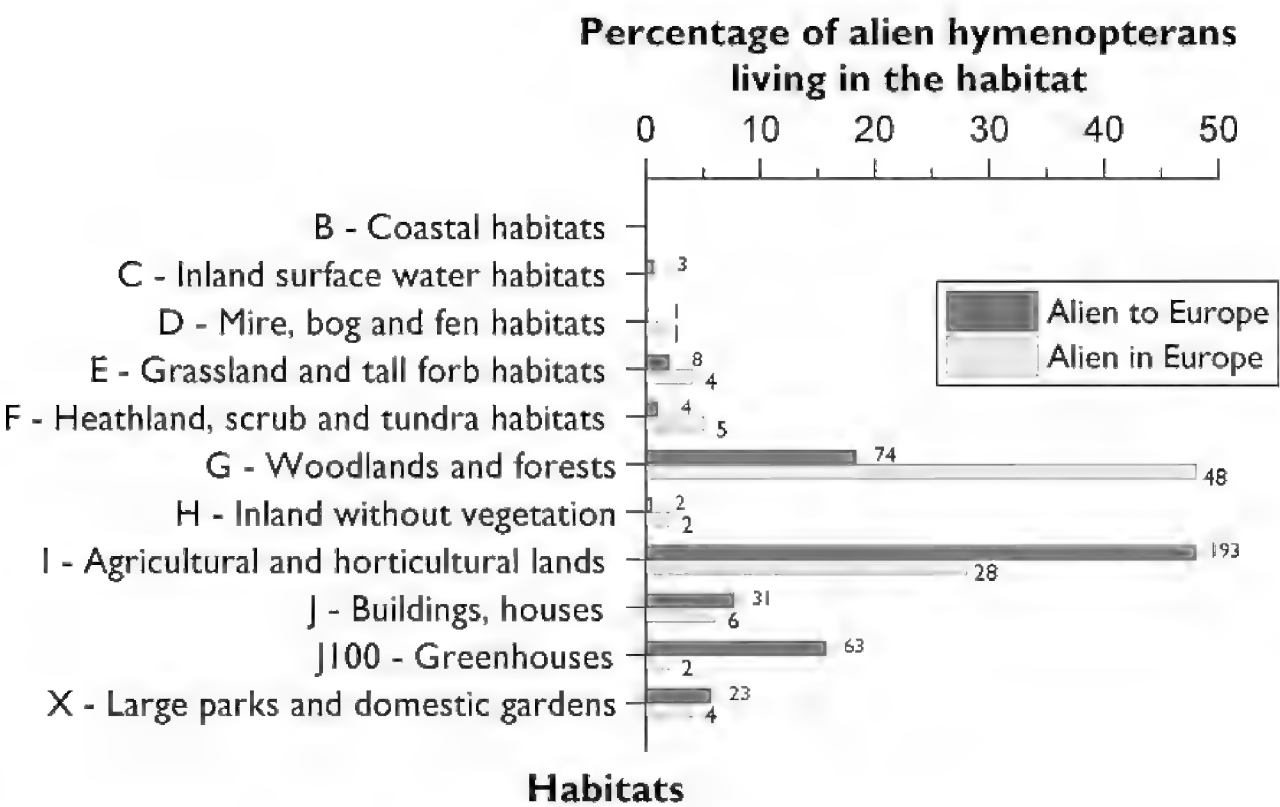


Figure 12.7. Main European habitats colonized by the species of Hymenoptera alien *to* Europe and alien *in* Europe. The number over each bar indicates the absolute number of alien hymenopterans recorded per habitat. Note that a species may have colonized several habitats.

degree of risk to non-target species and there is clear evidence of non-target effects (Lynch and Thomas 2000). Indeed, some butterfly populations have suffered a range reduction likely due to parasitism from an introduced wasp (Benson et al. 2003a, Benson et al. 2003b). Recently, Babendreier et al. (2003) found in laboratory experiments that *Trichogramma brassicae* (a parasitoid largely used against *Ostrinia nubilalis* (Hübner) on maize) parasitizes eggs of 22 out of 23 lepidopteran species tested, including several which are listed on the Swiss red list of endangered species. Because researchers have not looked systematically for non-target effects, they are probably underestimated in Europe. Biological control is potentially a valuable control strategy against invasions of alien insect pest species in agricultural and forest ecosystems. Nevertheless, post-release monitoring of biological control agents on target and nontarget species has yet to be developed. This is an ethical responsibility of scientists (Delfosse 2005) and it could help to resolve uncertainties in the impact of releases.

One of the most pernicious effects of introduced ants is the elimination or displacement of native ants and potential cascading effects on other trophic levels. Indeed, invasive ant species have huge colonies that exploit local resources and therefore represent a considerable threat to native ants. This ecological advantage of invasive ant species is partly attributed to their unicoloniality that promotes high worker densities and to the presence of several queens that accelerate colony growth and propagation



Figure 12.8. Chestnut gall induced by the chestnut gall wasp, *Dryocosmus kuriphilus* (Credit: Milka Glavendekić).



Figure 12.9. Female of cedar seed chalcid, *Megastigmus schimitscheki*, ovipositing on a cedar cone. (Credit: Gaëlle Rouault).

(Giraud et al. 2002), sometimes coupled with diet plasticity allowing them to exploit human residues.

Introduced alien parasitoids have also been suspected to displace native parasitoids by competition; however, reliable examples are still rare. One reported case in Europe is the probable displacement of *Encarsia margaritiventris* (Mercet), a parasitoid of the whiteflies *Aleurotuba jelineki* (Frauenfeld) following the introduction of *Cales noacki* (Viggiani 1994b).

There is still debate about the extent to which an introduced bee could alter native pollinator communities. Some studies clearly show that introduction of non-native bees may have strong impacts on local communities of bees (Goulson 2003), but their effects have been poorly documented in Europe. However, it is important to keep in mind that generalist *polylectic* bees (i.e. *Apis*, *Bombus*) may compete with native flower visitors (bees, wasps, butterflies, moths, beetles and flies) (Ings et al. 2006), as well as competing for nest sites. There is also evidence that introduced bees could bear pathogenic, commensal and mutualistic organisms, that could be co-introduced and transmitted to native Apidae (Goka et al. 2001). Exotic bees could also disrupt native pollinator services and could be the only pollinators of weeds, improving their seed set and spread.

Genetic impacts of Hymenoptera are clearly underestimated and there is strong risk that introduced species may hybridize with locally adapted populations. This case has been reported for *Bombus* and *Apis*, and there is a strong risk that commercial and native subspecies will hybridize with alien ones (Goulson 2003, Ings et al. 2005,

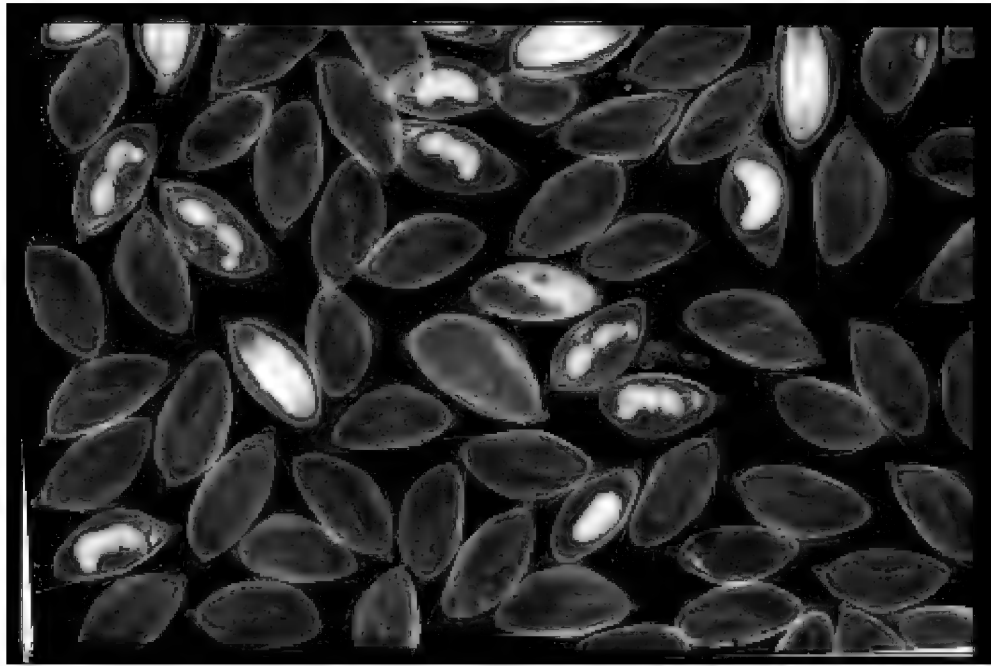


Figure 12.10. X-ray picture of Douglas fir seeds showing seeds infested by larvae and pupae of the Douglas-fir seed chalcid, *Megastigmus spermotrophus* (Credit: Jean-Paul Raimbault).



Figure 12.11. Nest of Asian Hornet, *Vespa velutina nigrothorax* (Credit: Claire Villemant)

Kanbe et al. 2008). Introduction of Mediterranean subspecies of *Apis mellifera*, *A. m. carnica* and *A. m. ligustica*, in northern Europe has led to extended gene flow and introgression between these subspecies and the native black honeybee, *A. m. mellifera* in different parts of Europe (De La Rúa et al. 2002, Jensen et al. 2005).

Introduced phytophagous Hymenoptera may also have strong economic and ecological impact. During mass-outbreaks they defoliate trees, reduce their growth and lead, sometimes, to their death. This is the case for diprionid outbreaks (De Somviele et al. 2004, Lyytikäinen-Saarenmaa and Tomppo 2002) as well as for xylophagous siricids that threaten pine plantations (Yemshanov et al. 2009).

Economic impacts of alien Hymenoptera have received little attention in Europe and consequently are clearly underestimated. However introduced alien ant species account for over \$120 billion of annual costs in the United States alone (Gutrich et al. 2007, Pimentel et al. 2000, Pimentel et al. 2005, Vis and Lenteren 2008). Introduced siricids in the United States are considered as an economically serious threat with a total projected loss of more than \$ 0.76 billion over 30 years (Yemshanov et al. 2009). The recent introduction in France of *Vespa velutina* would also have a significant impact on beekeeping because this hornet mainly preys on honeybees (see factsheet 14.62). Additionally displacement of native bees may also lead to important economic costs that are nevertheless difficult to estimate (Allsopp et al. 2008, Gallai et al. 2009, Veddeler et al. 2008).

12.9. References

- Abd-Rabou S (1999) Biological control of the cotton whitefly, *Bemisia tabaci* (Gennadius) (Homoptera: Aleyrodidae), in Egypt. *Shashpa* 6: 53–57.
- Achterberg van C, Aartsen van B (1986) The European Pamphiliidae (Hymenoptera: Symphyta), with special reference to the Netherlands. *Zoologische Verhandelingen, Leiden* 234: 1–98.
- Albert R, Schneller H (1994) *Eretmocerus californicus* - ein weiterer Gegenspieler der Weissen Fliege. *TASPO Gartenbau Magazin* 3: 44–45.
- Alexandrakis N, Neuenschwander P (1979) Influence of road dust on *Aspidiotus nerii* Bouché (Hom. Diaspididae) and its main parasite, *Aphytis chilensis* How. (Hym., Aphelinidae), observed on olive. *Annales de Zoologie - Écologie Animale* 11: 171–184.
- Alexandrakis V, Benassy C (1981) Experiment in biological control on olive in Crete using *Aphytis melinus* DeBach (Hym. Aphelinidae), parasite of *Aspidiotus nerii* Bouche (Hom. Diaspididae). *Acta Oecologica, Oecologia Applicata* 2: 13–25.
- Allsopp MH, de Lange WJ, Veldtman R (2008) Valuing insect pollination services with cost of replacement. *Plos One* 3.
- Anagnou-Veroniki M, Papaioannou-Souliotis P, Karanastasi E, Giannopolitis CN (2008) New records of plant pests and weeds in Greece, 1990–2007. *Hellenic Plant Protection Journal* 1: 55–78.

- Annecké DP, Mynhardt MJ (1979) On *Metaphycus stanleyi* Compere and two new species of *Metaphycus* Mercet from Africa. *Journal of the Entomological Society of Southern Africa* 42: 143–150.
- Annecké DP, Mynhardt MJ (1979) On the type-species and three new species of *Prococcophagus* Silvestri from South Africa (Hymenoptera: Aphelinidae). *Journal of the Entomological Society of Southern Africa* 42: 289–297.
- Annala E (1970) Host trees and emergence of *Megastigmus specularis* Walley (Hym., Torymidae). *Annales Entomologici Fennici* 36: 186–190.
- Anonymous (2005) *Dryocosmus kuriphilus*. *Bulletin OEPP* 35: 422–424.
- Applebaum SW, Rosen D (1964) Ecological studies on olive scale, *Parlatoria oleae* in Israel. *Journal of Economic Entomology* 57: 847–850.
- Argov Y, Rössler Y (1988) Introduction of beneficial insects into Israel for the control of insect pests. *Phytoparasitica* 16: 303–315.
- Argov Y, Rössler Y (1996) Introduction, release and recovery of several exotic natural enemies for biological control of the citrus leafminer, *Phyllocnistis citrella*, in Israel. *Phytoparasitica* 24: 33–38.
- Argov Y, Zchori-Fein E, Rosen D (1995) Biosystematic studies in the *Aphytis lingnanensis* complex. *Israel Journal of Entomology* 29: 315–320.
- Argyriou LC (1974) O.I.L.B. ‘Coccoids of citrus’ study group meeting in Morocco (26–31 October, 1970). *Al Awamia* 37: 57–65.
- Argyriou LC, Katsoyannos P (1976) Establishment and dispersion of *Metaphycus helvolus* Compere in Kerkyra (Corfu) on *Saissetia oleae* (Olivier). *Annales de l’Institut Phytopathologique Benaki* 11: 200–208.
- Argyriou LC, Kourmadas AL (1979) Notes on the biology and natural enemies of the olive tree scale *Parlatoria oleae* Colvée on olive trees in central Greece. *Mededelingen van de Faculteit Landbouwwetenschappen, Rijksuniversiteit Gent* 44: 39–48.
- Argyriou LC, Kourmadas AL (1980) *Ceroplastes floridensis* Comstock an important pest of citrus trees in the Aegean islands. *Fruits, Paris* 35: 705–708.
- Argyriou LC, Michelakis S (1975) *Metaphycus lounsburyi* Howard (Hymenoptera: Encyrtidae), parasite nouveau de *Saissetia oleae* Berne. en Crète, Grèce. *Fruits, Paris* 30: 251–254.
- Arzone A, Vidano C (1978) Introduzione in Italia di *Patasson nitens*, parassita di un nuovo nemico dell’Eucalipto. *Informatore Agrario* 34: 2741–2744.
- Askew RR, Nieves Aldrey JL (2000) The genus *Eupelmus* Dalman, 1820 (Hymenoptera, Chalcidoidea, Eupelmidae) in peninsular Spain and the Canary islands, with taxonomic notes and descriptions of new species. *Graellsia* 56: 49–61.
- Avidov Z, Rosen D, Gerson U (1963) A comparative study on the effects of aerial versus ground spraying of poisoned baits against the Mediterranean fruit fly on the natural enemies of scale insects in *Citrus* groves. *Entomophaga* 8: 205–212.
- Babendreier D, Kuske S, Bigler F (2003) Non-target host acceptance and parasitism by *Trichogramma brassicae* Bezdenko (Hymenoptera: Trichogrammatidae) in the laboratory. *Biological Control* 26: 128–138.
- Babi A, Pintureau B, Voegelé J (1984) Etude de *Trichogramma dendrolimi* (Hymenoptera: Trichogrammatidae): description d’une nouvelle sous-espèce. *Entomophaga* 29: 369–380.

- Baez M, Askew RR (1999) New records of Chalcidoidea (Hymenoptera) from the Canary Islands. *Boletín de la Asociación Española de Entomología* 23: 65–82.
- Bak J (1999) Injuries to seeds and cones of silver fir *Abies alba* Mill. from pests in selected stands of the Swietokrzyski National Park. *Sylvan* 143: 83–89.
- Bale JS, van Lenteren JC, Bigler F (2008) Biological control and sustainable food production. *Philosophical Transactions of the Royal Society B-Biological Sciences* 363: 761–776.
- Bar-Zakay I, Peleg BA, Chen C (1987) Spherical mealybug infesting citrus in Israel. *Alon Ha'notea* 41: 855–860.
- Baraja MJ, Gonzalez S, Montalban C (1996) Manejo integrado en cultivo de melon entutorado bajo invernadero. *Revista de Hortalizas, Flores y Plantas Ornamentales* 113: 29–32.
- Barbagallo S, Longo S, Siscaro G, Reina P, Zappalà L (2000) Status of biological control of the citrus leafminer (*Phyllocnistis citrella*) in Italy. *Abstracts, XXI International Congress of Entomology, Brazil, August 20–26, 2000* 1: 375.
- Barbagallo S, Patti I, Cavalloro R (1983) Citrus aphids and their entomophages in Italy. *Aphid antagonists. Proceedings of a meeting of the EC Experts' Group, Portici, Italy, 23–24, November 1982.*: 116–119.
- Battaglia D (1988) A note on the male of *Comperiella lemniscata* Compere and Annecke (Hymenoptera, Encyrtidae). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 45: 77–80.
- Battaglia D, Leo Ad, Malinconico P, Rotundo G (1994) Osservazioni sulla cocciniglia bianca del pesco e del gelso in Basilicata. *Informatore Agrario* 50: 77–80.
- Battisti A, Sun JH (1996) A survey of the spruce web-spinning sawflies of the genus *Cephalcia* Panzer in north-eastern China, with a guide to the identification of prepupae (Hym, Pamphiliidae). *Zeitschrift für Angewandte Entomologie* 120: 275–280.
- Beardsley JW, Rasplus JY (2001) A new species of *Josephiella* (Hymenoptera: Agaonidae) forming leaf galls on *Ficus microcarpa* L. (Moraceae). *Journal of Natural History* 35: 33–40.
- Bednarek A, Goszczynski W (2002) The costs of biological pest control in protected tomato crops. *Bulletin OILB. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique* 25: 5–8.
- Ben-Dov Y (1978) Taxonomy of the nigra scale *Parasaissetia nigra* (Nietner) (Homoptera: Coccoidea: Coccidae), with observations on mass rearing and parasites of an Israeli strain. *Phytoparasitica* 6: 115–127.
- Bénassy C, Bianchi H (1974) Observations sur *Aonidiella aurantii* Mask. et son parasite indigène *Comperiella bifasciata* How. (Hymenoptera, Encyrtidae). *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique* 3: 39–50.
- Benassy C, Bianchi H, Franco E (1974) Note sur l'introduction en France d'*Aphytis lepidosaphes* (Comp.) (Hymenopt. Aphelinidae), parasite de *Lepidosaphes beckii* Newm. (Homopt., Diaspidinae). *Compte Rendu de l'Académie d'Agriculture de France* 60: 191–196.
- Bénassy C, Bianchi H, Milaire H (1965) Research on the utilisation of *Prospaltella perniciosi* Tow. in France. *Annales de l'Institut National de la Recherche Agronomique (C - Annales des Épiphyties)* 15: 457–472.

- Benassy C, Brun P (1989) *Encarsia elongata* Dozier (Hymenoptera, Aphelinidae), a new entomophagous species introduced in France among the citrus scale insects. *Mededelingen van de Faculteit Landbouwwetenschappen, Rijksuniversiteit Gent* 54: 861–865.
- Bénassy C, Mathys G, Neuffer G, Milaire H, Bianchi H et al. (1968) L'utilisation pratique de *Prospaltella perniciosi* Tow. parasite du pou de San José *Quadraspidiotus perniciosus* Comst. *Entomophaga Mémoires Hors-Série* 4: 28pp.
- Benassy C, Pinet C (1987) Sur l'introduction en France d'*Aphytis yanonensis* De Bach & Rosen (Hym.: Aphelinidae) parasite de la Cochenille japonaise des Citrus: *Unaspis yanonensis* Kuw. (Hom.: Diaspididae). *Compte Rendu de l'Académie d'Agriculture de France* 73: 33–38.
- Bennett FD (2005) Occurrence of the eucalyptus psyllid *Ctenarytaina eucalypti* (Maskell) (Hom.: Psylloidea) and its parasitoid *Psyllaephagus pilosus* Noyes (Hym.: Encyrtidae) in the Isle of Man. *Entomologist's Record and Journal of Variation* 117: 159–163.
- Benson J, Pasquale A, Van Driesche R, Elkinton J (2003) Assessment of risk posed by introduced braconid wasps to *Pieris virginienensis*, a native woodland butterfly in New England. *Biological Control* 26: 83–93.
- Benson J, Van Driesche RG, Pasquale A, Elkinton J (2003) Introduced braconid parasitoids and range reduction of a native butterfly in New England. *Biological Control* 28: 197–213.
- Beratliet C (1967) An important parasite of cereal weevils *Anisopteromalus calandrae* How. *Analele Institutului de Cercetari pentru Protectia Plantelor* 4: 253–254.
- Bernard F (1968) Les Fourmis (Hymenoptera Formicidae) d'Europe occidentale et septentrionale. Paris: Masson et Cie. 411 pp.
- Berndt O, Meyhofer R, Richter E (2007) Whitefly on cut gerbera: Biological control by parasitoids or predatory mites? *Gesunde Pflanzen* 59: 171–178.
- Biermann GM (1973) Untersuchungen zur Einbürgerung der nordamerikanischen Pimpline *Itoplectis conquisitor* (Say) (Hymenoptera: Ichneumonidae) als Parasit von *Rhyacionia buoliana* Den. & Schiff. (Lepidoptera: Olethreutidae) in Nordwestdeutschland.: viii+133[+131] pp.
- Billany DJ, Brown RM (1980) The web spinning larch sawfly *Cephalcia lariciphila* - a new pest of *Larix* in England and Wales. *UK. Forestry (Oxford)* 53: 71–80.
- Bitsch J, Barbier Y (2006) Répartition de l'espèce invasive *Sceliphron curvatum* (F. Smith) en Europe et plus particulièrement en France (Hymenoptera, Sphecidae). *Bulletin de la Société entomologique de France* 111: 227–237.
- Bitsch J, Barbier Y, Gayubo F, Schmidt K, Ohl M (1997) Hyménoptères Sphecidae d'Europe occidentale. Volume 2. Faune de France 82. Paris. 429 pp.
- Bjegovic PS (1962) A new method of rearing the egg-parasite of the gypsy moth, *Ooencyrtus kuwanae* How *Arhiv za Poljoprivredne Nauke, Beograd* 15(48): 105–113.
- Blacker NC (2007) Ants (Hym., Formicidae) in East Anglia - Additional records from 2005. *Entomologist's Monthly Magazine* 143: 69–89.
- Blumberg D (1977) Encapsulation of parasitoid eggs in soft scales (Homoptera: Coccidae). *Ecological Entomology* 2: 185–192.
- Blumberg D, Wysoki M, Hadar D (1993) Further studies on the encapsulation of eggs of *Metaphycus* spp. (Hym.: Encyrtidae) by the pyriform scale, *Protopulvinaria pyriformis* (Hom.: Coccidae). *Entomophaga* 38: 7–13.

- Blumberg D, Ben-Dov Y, Gross S, Drishpoun Y, Mendel Z (1999) Outbreaks and biological control of the citriculus mealybug *Pseudococcus cryptus* Hempel in Israel in the past and present - revaluation and current situation. *Alon Ha'notea* 53: 155–160.
- Blumberg D, Ben-Dov Y, Mendel Z (1999) The citriculus mealybug, *Pseudococcus cryptus* Hempel, and its natural enemies in Israel: History and present situation. *Entomologica* 33: 233–242.
- Boer P, Dekoninck W, van Loon AJ, Vankerkhoven F (2003) List of ants (Hymenoptera: Formicidae) of Belgium and The Netherlands, their status and Dutch vernacular names. *Entomologische Berichten* 63: 54–58.
- Boer P, van Nunen F, Blommaart J, Vorst O, Huijbregts H (2006) The ant *Hypoponera punctatissima* outdoors in the Netherlands. *Entomologische Berichten* 66: 56–57.
- Boer P, Vierbergen B (2008) Exotic ants in The Netherlands (Hymenoptera: Formicidae). *Entomologische Berichten* 68: 121–129.
- Bogusch P, Liska P, Lukas J, Dudich A (2005) Spreading and summary of the knowledge of the invasive sphecid wasp *Sceliphron curvatum* (SMITH 1870) in the Czech Republic and Slovakia (Hymenoptera: Apocrita, Sphecidae). *Linzer Biologische Beiträge* 37: 215–221.
- Boomsma JJ, Brouwer AH, Van Loon AJ (1990) A new polygynous *Lasius* species (Hymenoptera, Formicidae).II. Allozymatic confirmation of specific status. *Insectes Sociaux* 37: 363–375.
- Borioni M (1991) *Chouioia cunea* Yang (Hymenoptera, Eulophidae), parasitoid of *Hyphantria cunea* (Drury) (Lepidoptera Arctiidae), new for Europe. *Bollettino di Zoologia Agraria e Bachicoltura, Milano* 23: 193–196.
- Botoc M (1971) Some Trichogrammatidae (Chalcidoidea, Trichogrammatidae) new for Romania's fauna. *Studia Universitatis Babes-Bolyai, Cluj (Ser. Biol.)* 16: 89–90.
- Boucek Z (1965) Studies of European Eulophidae, IV: *Pediobius* and two allied genera (Hymenoptera). *Acta Faunistica Entomologica Musei Nationalis Pragae* 36: 5–90.
- Boucek Z (1968) Contributions to the Czechoslovak fauna of Chalcidoidea (Hym.). *Acta Faunistica Entomologica Musei Nationalis Pragae* 12: 231–260.
- Boucek Z (1976) African Pteromalidae (Hymenoptera); new taxa synonymies and combinations. *Journal of the Entomological Society of Southern Africa* 39(1): 9–31.
- Boucek Z (1977) Descriptions of *Tachinobia* gen.n. and three new species of Tetrastichinae (Hymenoptera: Eulophidae), with a tentative key to genera. *Bulletin of Entomological Research* 67(1): 17–30.
- Boucek Z (1977) A faunistic review of the Yugoslavian Chalcidoidea (Parasitic Hymenoptera). *Acta Entomologica Jugoslavica* 13 (Supplement): 1–145.
- Boucek Z (1991) Four new genera of European Pteromalidae (Hymenoptera), with some taxonomic changes. *Bollettino di Zoologia Agraria e Bachicoltura, Milano* 22: 195–206.
- Bouček Z (1988) Australasian Chalcidoidea (Hymenoptera) : a biosystematic revision of genera of fourteen families, with a reclassification of species. Wallingford, Oxon, UK: CAB International. 1–832 pp.
- Boucek Z, Graham MWRdV (1978) British check-list of Chalcidoidea (Hymenoptera): taxonomic notes and additions. *Entomologist's Gazette* 29: 225–235.

- Boucek Z, Rasplus JY (1991) Illustrated key to West-Palearctic Genera of Pteromalidae (Hymenoptera - Chalcidoidea). In: Paris: INRA Editions, série Techniques et Pratiques, 1–140.
- Branco M, Boavida C, Durand N, Franco JC, Mendel Z (2009) Presence of the Eucalyptus gall wasp *Ophelimus maskelli* and its parasitoid *Closterocerus chamaeleon* in Portugal: First record, geographic distribution and host preference. *Phytoparasitica* 37: 51–54.
- Breisch H, Streito JC (2004) Oriental chestnut gall wasp: a new plague for Europe. *Infos-Ctifl*: 34–37.
- Brodeur J, Boivin G (2004) Functional ecology of immature parasitoids. *Annual Review of Entomology* 49: 27–49.
- Bue Pl, Colazza S (2005) *Diaspis echinocacti* (Bouché) a dangerous pest of cactus. *Informatore Fitopatologico* 55: 34–37.
- Buijs MJ, Pirovano I, Lenteren JCv (1981) *Encarsia pergandiella*, a possible biological control agent for the greenhouse whitefly, *Trialeurodes vaporariorum*. A study on intra- and inter-specific host selection. *Mededelingen van de Faculteit Landbouwwetenschappen, Rijksuniversiteit Gent* 46: 465–475.
- Burks BD (1958) A new *Bruchophagus* from liliaceous plant with a host plant list for the genus (Hymenoptera, Eurytomidae). *Proceedings of the Entomological Society of Washington* 59: 273–277.
- Burnett T (1962) An effect of parasite attack on host mortality, as exemplified by *Encarsia formosa* and *Trialeurodes vaporariorum*. *Canadian Entomologist* 94: 673–679.
- Cadahia D (1986) Importance des insectes ravageurs de l'eucalyptus en région méditerranéenne. *Bulletin OEPP* 16: 265–283.
- Canard M, Laudeho Y (1977) Studies on a second winter generation of *Saissetia oleae* in Attica (Greece) and its reduction by *Metaphycus lounsburyi* and *Scutellista cyanea*. *Fruits, Paris* 32: 554–561.
- Carniel A, Governatori G (1994) Notes on ants of Meduna River Park (Pordenone plain, North-eastern Italy). *Atti XVII Congresso Nazionale Italiano di Entomologia*: 481–482.
- Carrero JM (1979) Toxicity in the field to *Cales noacki* How., a parasite of the citrus whitefly *Aleurothrixus floccosus* Mask., of several insecticides (in Spanish). *Anales del Instituto Nacional de Investigaciones Agrarias (Serie Protección Vegetal)* 1979: 75–91.
- Carrero JM (1980) Current status of biological control of citrus scale-insects in Valencia (Spain). *Fruits, Paris* 35: 625–631.
- Castro L (2007) New data on the spread of *Sceliphron curvatum* (Smith 1870) in the Iberian Peninsula (Hymenoptera : Sphecidae). *Boletín de la Asociación Española de Entomología*: 537–538.
- Cetkovic A, Radovic I, Dorovic L (2004) Further evidence of the Asian mud-daubing wasps in Europe (Hymenoptera : Sphecidae). *Entomological Science* 7: 225–229.
- Chauzat MP, Purvis G, Dunne F (2002) Release and establishment of a biological control agent, *Psyllaephagus pilosus* for eucalyptus psyllid (*Ctenarytaina eucalypti*) in Ireland. *Annals of Applied Biology* 141: 293–304.
- Chumak PY (2003) The parasite of *Eretmocerus* in greenhouses of the Ukraine. *Zashchita i Karantin Rastenii* 2003: 31.

- CIBC (1976) Report of work carried out during 1975. *Commonwealth Institute of Biological Control, Commonwealth Agricultural Bureaux, Slough, U.K.*: 10.
- Clausen CP (1978) Introduced parasites & predators of Arthropod pests and weeds: A world review. Washington D.C.: United States Department of Agriculture, Agriculture Handbook No. 480 pp.
- Collingwood CA (1958) A survey of Irish Formicidae. *Proceedings of the Royal Irish Academy* 59(B): 213–219.
- Collingwood CA (1993) A comparative study of the ant fauna of five Greek islands. *Biologia Gallo-Hellenica* 20: 191–197.
- Collingwood CA, Hughes J (1987) Ant species in Yorkshire (England, UK). *Naturalist* 112: 95–101.
- Collingwood CA, Tigar BJ, Agosti D (1997) Introduced ants in the United Arab Emirates. *Journal of Arid Environments* 37: 505–512.
- Compton SG (1989) The fig wasp *Odontofroggattia galili* (Hymenoptera: Pteromalidae) in the Greek isles. *Entomologist's Gazette* 40: 183–184.
- Conti E, Bin F (2000) Parasitoids of concealed noctuid eggs and their potential in biological control of Gramineae stemborers (1). *Redia*: 87–104.
- Costa A, Stary P (1988) *Lysiphlebus testaceipes*, and introduced aphid parasitoid in Portugal (Hym., Aphidiidae). *Entomophaga* 33: 403–412.
- Costanzi M, Frasseti F, Malausa JC (2003) Biological control of the psyllid *Ctenarytaina eucalypti* Maskell in eucalyptus plantations of Ligurian Riviera. *Informatore Fitopatologico* 53: 52–56.
- Costanzi M, Malausa JC, Cocquempot C (2003) A new psyllid on the eucalyptus of the Ligurian and French Riviera: first observations of *Ctenarytaina spatulata* on southern Europe. *Phytoma*: 48–51.
- Csoka G, Wittmann F, Melika G (2009) The oriental sweet chestnut gall wasp (*Dryocosmus kuriphilus* Yasumatsu, 1951) in Hungary. *Novenyvdelem* 45: 359–360.
- Czechowska W, Czechowski W (1999) *Lasius neglectus* Van Loon, Boomsma & Andrásfalvy, 1990 (Hymenoptera, Formicidae), nowy dla Polski gatunek mrówki w Warszawie. *Przegląd Zoologiczny* 43: 189–191.
- Czechowski W, Czechowska W (1999) New data on the occurrence of ants of the subfamily Ponerinae (Hymenoptera, Formicidae) in Poland. *Fragmenta Faunistica* 42: 7–10.
- Czechowska W, Czechowski W (2003) Further record of *Lasius neglectus* Van Loon, Boomsma & Andrásfalvy (Hymenoptera: Formicidae) from Warsaw, with a key to the Polish species of the subgenus *Lasius* s.str. *Fragmenta Faunistica* 46: 195–202.
- Danon V (1989) Biological control of the European corn borer, *Ostrinia nubilalis* (Hübner), by *Trichogramma pretiosum* Riley. *Zastita Bilja* 40: 131–141.
- Darling DC (1999) Life history and immature stages of *Steffanolampus salicetum* (Hymenoptera: Chalcidoidea: Perilampidae). *Proceedings of the Entomological Society of Ontario* 130: 3–14.
- De Haro A, Collingwood CA, Comin P (1986) Prospección mirmecológica por Ibiza y Formentera (Balears). *Orsis* 2: 115–120.
- de Jonge JT (1985) Remarkable insects in and around buildings in 1984. *Entomologische Berichten (Amsterdam)* 45: 166–168.

- De La Rúa P, Serrano J, Galian J (2002) Biodiversity of *Apis mellifera* populations from Tenerife (Canary Islands) and hybridisation with East European races. *Biodiversity and Conservation* 11: 59–67.
- De Somviele B, Lyytikäinen-Saarenmaa P, Niemela P (2004) Sawfly (Hym., Diprionidae) outbreaks on Scots pine: effect of stand structure, site quality and relative tree position on defoliation intensity. *Forest Ecology and Management* 194: 305–317.
- DeBach P (1960) The importance of taxonomy to biological control as illustrated by the cryptic history of *Aphytis holoxanthus* n. sp. (Hymenoptera: Aphelinidae), a parasite of *Chrysomphalus aonidum*, and *Aphytis coheni* n. sp., a parasite of *Aonidiella aurantii*. *Annals of the Entomological Society of America* 53: 701–705.
- DeBach P, Rose M (1976) Biological control of woolly whitefly *California Agriculture* 30(5): 4–7.
- DeBach P, Rosen D (1976) Chapter 6. Armoured scale insects. In: Delucchi VL (Ed) *Studies in Biological Control*. International Biological Programme Synthesis Series (No. 9): Cambridge University Press, 139–178.
- Dekoninck W, De Baere C, Mertens J, Maelfait J-P (2002) On the arrival of the Asian invader ant *Lasius neglectus* in Belgium (Hymenoptera, Formicidae). *Bulletin et Annales de la Société Royale Entomologique de Belgique* 138: 45.
- Del Bene G, Gargani E (1991) Notes on *Aleurothrixus floccosus* Mask. (Homoptera; Aleyrodidae) and its aphelinid parasitoid *Cales noacki* How. in Tuscany (in Italian). *Redia* 74: 111–126.
- Del Guercio G (1925) Il pidocchio lanigera del melo ed il suo nemico endofago, *Aphelinus mali* Hald. var *italica* Del Guercio. (Continuazione, vedi num. prec.). *Agricoltura Coloniale* 19: 121–128.
- Del Guercio G (1931) Il pidocchio nero ver noir o barban dell'olivo (*Phloeothrips oleae* Costa) ed i suoi rapporti con i punteruoli. *Redia* 19: 75–195.
- Delanoue P (1960) Essai d'élevage artificiel permanent d'*Opius concolor* Szep. sur un hôte intermédiaire et lâchers expérimentaux de ce parasite de *Dacus oleae* Gmel. dans les Alpes-Maritimes. *Informations Oléicoles internationales* 10: 15 p.
- Delfosse ES (2005) Risk and ethics in biological control. *Biological Control* 35: 319–329.
- Delvare G (1995) The family Chalcididae. In: Hanson PE, Gauld ID (Eds) *The Hymenoptera of Costa Rica*. Oxford: Oxford Science Publications & The Natural History Museum.
- Delvare G (2006) 11.5 Familia Chalcididae. In: Hanson PE, Gauld ID (Eds) *Hymenoptera de la Región Neotropical: Memoirs of the American Entomological Institute*, vol. 77, 333–340.
- Dessart P (1994) New or unusual Hymenoptera Ceraphronidae. *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique Entomologie* 64: 49–103.
- Dessart P, Cammaerts R (1995) Recapture of *Hypoponera punctatissima* in Belgium (Hymenoptera Formicidae Ponerinae). *Bulletin and Annales de la Société Royale Belge d'Entomologie* 131: 487–489.
- Domenichini G (1967) Contributo alla conoscenza biologica e tassinomica dei Tetrastichinae palearctici (Hymenoptera Eulophidae). *Bollettino di Zoologia Agraria e Bachicoltura, Milano* 2: 75–110.
- Domenichini G, Remaudière G, Delucchi V (1964) Hym. Eulophidae. Palearctic Tetrastichinae. Paris: Le François. 101 pp.

- Drost YC, Elmula AF, Posthuma-Doodeman CJAM, Van Lenteren JC (1996) Development of selection criteria for natural enemies in biological control: Parasitoids of *Bemisia argentifolii*. *Proceedings of the Section Experimental and Applied Entomology of the Netherlands Entomological Society (N.E.V.)*: 165–170.
- Dzhanokmen KA (1984) A new genus of the family Pteromalidae (Hymenoptera) from the Asian part of the USSR. *Zoologicheskii Zhurnal* 64(1): 151–153.
- Ebmer AW (1995) Hymenopterological notes from Austria: part 2 (Insecta: Hymenoptera aculeata). *Linzer Biologische Beiträge* 27: 273–277.
- Edwards R (1997) Provisional atlas of the aculeate Hymenoptera of Britain and Ireland. Part 1, p. 139. Bees, Wasps and Ants Recording Society., Huntingdon: Biological Records Centre.
- Eliopoulos PA, Athanasiou CG, Buchelos CH (2002) Occurrence of hymenopterous parasitoids of stored product pests in Greece. *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique* 25: 127–139.
- Embleton AL (1902) On the economic importance of the parasites of Coccidae. *Transactions of the Royal Entomological Society of London* 35: 223.
- Erdős J (1953) Additamenta ad cognitionem faunae Chalcidoidarum in Hungaria et regionibus finitimis. V. 11. Thysanidae, 12. Aphelinidae, 17. Tetracampidae, 18. Elasmidae. *Folia Entomologica Hungarica* 6: 165–184.
- Erdős J (1954) Az *Eridontomerus* Crawf. nemzetség (Torymidae, Hymen.) fajai. *Allattani Közlemények* 44: 149–160.
- Erdős J (1956) Additamenta ad cognitionem faunae Chalcidoidarum in Hungaria et regionibus finitimis VII. 20 Trichogrammatidae. *Folia Entomologica Hungarica* 9: 403–410.
- Ermolenko VM, Sem'yanov VP (1981) Development of the fauna of sawflies (Hymenoptera, Symphyta) of man-made coenoses of cultivated lands in the south of the European part of the USSR. *Noveishie dostizheniya sel'skokhozyaistvennoi entomologii (po materialam USh s'ezda VEO, Vil'nyus, 9–13 oktyabrya 1979 g.)*: 73–76.
- Espadaler X (1979) Citas nuevas o interesantes de hormigas para España. *Boletín de la Asociación Española de Entomología* 3: 95–101.
- Espadaler X (1999) *Lasius neglectus* Van Loon, Boomsma & Andrásfalvy, 1990 (Hymenoptera, Formicidae), a potential pest ant in Spain. *Orsis* 14: 43–46.
- Espadaler X, Bernal V (2003) Exotic ants in the Canary Islands (Hymenoptera: Formicidae). *Vieraea* 31: 1–7.
- Espadaler X, Collingwood CA (2000) Transferred ants in the Iberian peninsula (Hymenoptera, Formicidae). *Nouvelle Revue d'Entomologie* 17: 257–263.
- Espadaler X, Espejo F (2002) *Tapinoma melanocephalum* (Fabricius, 1793), a new exotic ant in Spain (Hymenoptera, Formicidae). *Orsis* 17: 101–104.
- Espadaler X, Lopez Soria L (1991) Rareness of certain Mediterranean ant species: fact or artifact? *Insectes Sociaux* 38: 365–377.
- Faber T, Sengonca C (1997) Laboratory studies on the longevity and the fecundity of *Coccophagus scutellaris* (Dalm.) (Hym., Aphelinidae) as a parasitoid of the horse chestnut scale insect *Pulvinaria regalis* Canard (Hom., Coccidae). *Gesunde Pflanzen* 49: 84–88.

- Fabre JP, Rabasse JM (1987) Introduction dans le Sud-Est de la France d'un parasite: *Pauesia cedrobii* [Hym.: Aphidiidae] du puceron: *Cedrobium laportei* [Hom.: Lachnidae] du cèdre de l'atlas: *Cedrus atlantica*. *Entomophaga* 32: 127–141.
- Fabritius K (1978) Laborzucht von *Muscidifurax raptor* Gir. & Sand. (Hym. Chalcidoidea) und sein Einsatz für die biologische Bekämpfung synanthropen Fliegen. *Mitteilungen der Deutschen Gesellschaft für Allgemeine und Angewandte Entomologie* 1: 231–233.
- Fabritius K (1981) Guided biological control of the synanthropic fly *Musca domestica* L. (Diptera-Muscidae) by means of the parasite *Muscidifurax raptor* Gir. & Sand. (Hymenoptera-Pteromalidae) (in Romanian with English summary). *Studii si Cercetari de Biologie* 33: 89–92.
- Falco JV, Garzon-Luque E, Perez-Hinarejos M, Tarazona I, Malagon J et al. (2006) Two native pupal parasitoids of *Ceratitis capitata* (Diptera, Tephritidae) found in Spain. *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique* 29: 71–74.
- Farrall MH, Paiva MR, Albino P (1992) Registo de uma nova especie do genero *Avetianella* (Hymenoptera, Encyrtidae) parasitoide oofago da broca do eucalipto *Phoracantha semi-punctata*. *Actas do Congresso Iberica de Entomologia* 5: 475–480.
- Ferrière C (1961) Notes sur les espèces paléarctiques du genre *Prospaltella* Ashmead (Hym. Aphelinidae). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 34: 253–269.
- Finlayson LH (1950) The biology of *Cephalonomia waterstoni* Gahan (Hym., Bethyridae) a parasite of *Loaemophloeus* (Col., Cucujidae) *Bulletin of Entomological Research* 41: 79–97.
- Finzi B (1936) Risultati scientifici della spedizione di S.A.S. il principe Alessandro della Torre e tasso nell'Egitto e penisola de Sinae. *Bulletin de la Société Royale Entomologique d'Egypte* 20: 155–210.
- Fitton MG, de V. Graham MWR, Boucek ZRJ, Fergusson NDM, Huddleston T et al. (1978) Hymenoptera. In: Kloet GS, Hincks WD (Eds) A checklist of British insects. Handbooks for the identification of British insects, 2nd ed. London: Royal Entomological Society of London, 1–159.
- Flabbee J, Petit N, Jay N, Guenard L, Codreanu F et al. (2008) The economic costs of severe anaphylaxis in France: an inquiry carried out by the Allergy Vigilance Network. *Allergy* 63: 360–365.
- Flanders SE (1969) An historical account of *Casca smithi* and its competitor *Aphytis holoxanthus*, parasites of Florida red scale. *Israel Journal of Entomology* 4: 29–40.
- Forel A (1874) Les fourmis de la Suisse. Systématique. Notices anatomiques et physiologiques. Architecture. Distribution géographique. Nouvelles expériences et observations de mœurs. *Neue Denkschriften der Allgemeinen Schweizerischen Gesellschaft für die gesammten Naturwissenschaften* 26: 1–452.
- Forster B, Castellazzi T, Colombi L, Furst E, Marazzi C et al. (2009) First record of the chestnut gall wasp *Dryocosmus kuriphilus* (Yasumatsu) (Hymenoptera, Cynipidae) in Southern Switzerland. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 82: 271–279.
- Freitag A, Dorn K, Cherix D (2000) First occurrence of the crazy ant *Paratrechina longicornis* (Latreille) (Hym. Formicidae: Formicinae) in Switzerland. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 73: 301–303.
- Frilli F (1965) Infested pasta. Investigations on the frequency of injurious insects and of their parasites. *Molini Ital* 7: 247–257.

- Fry JM (1989) Natural enemy databank, 1987. A catalogue of natural enemies of arthropods derived from records in the CIBC Natural Enemy Databank. Wallingford, Oxford, UK CAB International. viii+185 pp.
- Galil J, Eisikowitch D (1968) On the pollination ecology of *Ficus religiosa* in Israel. *Phytomorphology* 18: 356–363.
- Gallai N, Salles JM, Settele J, Vaissiere BE (2009) Economic valuation of the vulnerability of world agriculture confronted with pollinator decline. *Ecological Economics* 68: 810–821.
- Gambaro PI (1965) Observations on the bionomics of *Prospaltella perniciosi* Tow. in the Po valley. *Entomophaga* 10: 373–376.
- Garonna AP (1994) On the occurrence in Italy of *Aphytis acrenulatus* Rosen & De-Bach (Hymenoptera: Aphelinidae) parasitic on *Rhizaspidiotus donacis* Leonardi (Homoptera: Diaspididae) *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 49: 53–59.
- Garonna AP, Viggiani G (1989) Notizie preliminari sulla *Comperiella lemniscata* Compere; Annecke (Hymenoptera: Encyrtidae), parassitoide di *Chrysomphalus dictyospermi* (Morg.) in Italia. *Redia* 72(2): 523–527.
- Garrido-Torres AM, Nieves-Aldrey JL (1990) Catalogo actualizado de los pteromalidos de la peninsula iberica e islas baleares (Hym., Chalcidoidea, Pteromalidae). *Boletín de la Asociación Española de Entomología* 14: 71–87.
- Gaston KJ (1991) The magnitude of global insect species richness. *Conservation Biology* 5: 283–296.
- Gauld ID, Bolton B (1988) The Hymenoptera. Oxford: Oxford University Press.
- Geiter O, Homma S, Kinzelbach R (2002) Bestandsaufnahme und Bewertung von Neozoen in Deutschland. Untersuchung der Wirkung von Biologie und Genetik ausgewählter Neozoen auf Ökosysteme und Vergleich mit den potentiellen Effekten gentechnisch veränderter Organismen. Berlin: Umweltbundesamt. 308 pp.
- Gerling D (1966) Biological studies on *Encarsia formosa* (Hymenoptera: Aphelinidae). *Annals of the Entomological Society of America* 59: 142–143.
- Gerling D, Motro U, Horowitz R (1980) Dynamics of *Bemisia tabaci* (Gennadius) (Homoptera: Aleyrodidae) attacking cotton in the coastal plain of Israel. *Bulletin of Entomological Research* 70(2): 213–219.
- Gerling D, Alomar O, Arno J (2001) Biological control of *Bemisia tabaci* using predators and parasitoids. *Crop Protection* 20: 779–799.
- Gerson U (1967) The natural enemies of the chaff scale, *Parlatoria pergandei* Comstock, in Israel. *Entomophaga* 12: 97–109.
- Gerson U, Mescheloff E, Dubitzki E (1975) The introduction of *Neodusmetia sangwani* (Rao) (Hymenoptera: Encyrtidae) into Israel for the control of the Rhodesgrass scale, *Antonina graminis* (Maskell) (Homoptera: Pseudococcidae). *Journal of Applied Ecology* 12(3): 767–779.
- Ghesquière J (1933) Sur *Diaspis visci* (Schr.) Low. et deux de ses parasites nouveaux pour la faune belge. *Bulletin et Annales de la Société Royale Entomologique de Belgique* 73: 343–349.
- Gibson GAP (1995) Parasitic wasps of the subfamily Eupelminae: classification and revision of world genera (Hymenoptera: Chalcidoidea: Eupelmidae). *Memoirs on Entomology International* 5: 70–100.

- Gibson GAP (2000) Differentiation of the species of *Urolepis* (Hymenoptera: Chalcidoidea: Pteromalidae), potential biocontrol, agents of filth flies (Diptera: Muscidae). *Canadian Entomologist* 132: 391–410.
- Gibson GAP (2009) Revision of New World Spalanginae (Hymenoptera: Pteromalidae). *Zootaxa*: 1–159.
- Gijswijt MJ (2003) Naamlijst van de Nederlandse bronswespen (Hymenoptera: Chalcidoidea). *Nederlandse Faunistische Mededelingen* 18: 47.
- Giorgini M (2001) Induction of males in thelytokous populations of *Encarsia meritoria* and *Encarsia protransvena*: a systematic tool. *BioControl* 46: 427–438.
- Giraud JE, Laboulbène A (1878) Liste des éclosions d'insectes observées par le Dr. Joseph Étienne Giraud, membre honoraire. Recueillie et annotée par M. le Dr. Alexandre Laboulbène. *Annales de la Société Entomologique de France* 5: 397–436.
- Giraud T, Pedersen JS, Keller L (2002) Evolution of supercolonies: The Argentine ants of southern Europe. *Proceedings of the National Academy of Sciences of the United States of America* 99: 6075–6079.
- Glas M, Hassan SA (1985) Mass production and utilization of *Trichogramma*. 5. Control of two Tortricids on cereal crops, *Cnephasia longana* (Haw) and *Cnephasia pumicana* (Z.) (Lep., Tortricidae). *Zeitschrift für Angewandte Entomologie* 99: 393–399.
- Glavendekic M (2000) Parasitoids and hyperparasitoids of *Agriopsis* spp. (Lepidoptera: Geometridae) in Serbia. *Glasnik Sumarskog Fakulteta, Univerzitet u Beogradu*: 59–72.
- Goka K, Okabe K, Yoneda M, Niwa S (2001) Bumblebee commercialization will cause worldwide migration of parasitic mites. *Molecular Ecology* 10: 2095–2099.
- Gokhman VY (1996) New and little known species of the tribe Phaeogenini (Hymenoptera, Ichneumonidae) from the southern part of European Russia and adjacent territories. *Entomological Review* 75: 81–88.
- Gomez K, Espadaler X (2006) Exotic ants (Hymenoptera: Formicidae) in the Balearic Islands. *Myrmecologische Nachrichten* 8: 225–233.
- Gonseth Y, Imbeck P, Tussac M (2001) *Sceliphron curvatum* (Smith, 1870), une espèce nouvelle de la faune Suisse et de la faune de France (Hymenoptera Sphecidae). *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 74: 99–103.
- Gonzalez A, Martin R, Reyes MA, Jimenez I, Suarez V, et al. (2008) Pest situation and biological control of *Bemisia tabaci* in canary islands. *Journal of Insect Science* 8: 22–22.
- Gonzalez Zamora JE, Moreno Vazquez R, Rodriguez Rodriguez MD, Rodriguez Rodriguez MP, Mirasol Carmona E et al. (1996) Development of parasitism of *Bemisia tabaci* (Gen.) and *Trialeurodes vaporariorum* (West.) (Homoptera: Aleyrodidae) in greenhouses in Almeria. *Boletín de Sanidad Vegetal Plagas* 22: 373–389.
- Gordh G, Moczar L (1990) A catalog of the World Bethyridae (Hymenoptera: Aculeata). *Memoirs of the American Entomological Institute* 46: 1–364.
- Gossner M, Liston A, Spaeth J (2007) Sawflies in the crowns of native and exotic trees, sampled with flight-interception traps in southern Germany (Hymenoptera : Symphyta). *Entomologia Generalis* 30: 273–282.

- Goudey-Perrière F, Perrière C, Brousee-Gaury P (1988) Découverte de *Comperia merceti* (Compere) en région Parisienne (Hym. Chalcidoidea Encyrtidae). *Bulletin de la Société entomologique de France* 92: 160.
- Goudey-Perrière F, Perrière C, Brousee-Gaury P (1991) *Comperia merceti* (Hymenoptera, Chalcidoidea, Encyrtidae) parasite des oothèques de la blatte des cuisines *Supella longipalpa* (Dictyoptera, Blattellidae). *Bulletin de la Société Zoologique de France* 116: 353–359.
- Goulet H, Huber JT (1993) Hymenoptera of the World: An identification guide to families. Ottawa: Agriculture Canada pp.
- Goulson D (2003) Effects of introduced bees on native ecosystems. *Annual Review of Ecology and Systematics* 34: 1–26.
- Graham MWRdV (1969) The Pteromalidae of north-western Europe (Hymenoptera: Chalcidoidea). *Bulletin of the British Museum (Natural History) (Entomology) Supplement* 16: 908pp, 686 figs.
- Graham MWRdV (1987) A reclassification of the European Tetrastichinae (Hymenoptera: Eulophidae), with a revision of certain genera. *Bulletin of the British Museum (Natural History) (Entomology)* 55(1): 1–392.
- Graham MWRdV (1991) A reclassification of the European Tetrastichinae (Hymenoptera: Eulophidae): revision of the remaining genera. *Memoirs of the American Entomological Institute* 49: 322 pp.
- Graziosi I, Santi F (2008) Chestnut gall wasp (*Dryocosmus kuriphilus*): spreading in Italy and new records in Bologna province. *Bulletin of Insectology* 61: 343–348.
- Greathead DJ (1976) Mediterranean fruit fly, olive fruit fly. In: Greathead PJ (Ed) A review of biological control in western and southern Europe: Commonwealth Institute of Biological Control, Technical Communication, 37–43.
- Grissell EE (1995) Toryminae (Hymenoptera: Chalcidoidea: Torymidae): a redefinition, generic classification and annotated world catalogue of species. *Memoirs on Entomology, International* 2: i-iii + 1–470.
- Grissell EE (1999) An annotated catalog of World Megastigminae (Hymenoptera: Chalcidoidea: Torymidae). *Contributions of the American Entomological Institute* 31: 1–92.
- Grissell EE, Prinsloo GL (2001) Seed-feeding species of *Megastigmus* (Hymenoptera: Torymidae) associated with Anacardiaceae. *Journal of Hymenoptera Research* 10: 271–279.
- Grubik P (1992) New pest for Czechoslovakia of the seeds of Japanese sophora. *Byulleten' Glavnogo Botanicheskogo Sada* 165: 62–64.
- Guerrieri E (1995) Influence of temperature on development and adult longevity of *Copidosoma koehleri* Blanchard (Hymenoptera: Encyrtidae) parasitoid of *Phthorimaea operculella* (Lepidoptera: Gelechiidae). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 50: 261–270.
- Guerrieri E, Noyes J (2005) Revision of the European species of *Copidosoma* Ratzeburg (Hymenoptera: Encyrtidae), parasitoids of caterpillars (Lepidoptera). *Systematic Entomology* 30: 97–174.
- Guerrieri E, Noyes JS (2000) Revision of european species of genus *Metaphycus* Mercet (Hymenoptera: Chalcidoidea: Encyrtidae), parasitoids of scale insects (Homoptera: Coccoidea). *Systematic Entomology* 25: 147–222.

- Guerrieri E, Pellizzari G (2009) Parasitoids of *Pseudococcus comstocki* in Italy. *Clausenia purpurea* and *Chrysoplatycerus splendens*: first records from Europe. *Bulletin of Insectology* 62: 179–182.
- Gullu M, Simsek N (1995) Studies on egg parasitoids of corn stalk borer (*Sesamia nonagrioides* Lef.) (Lep.:Noctuidae) and European corn borer (*Ostrinia nubilalis* Hbn.) (Lep.:Pyralidae) in east Mediterranean region of Turkey. *Zirai Mucadele Arastrma Yllg.* 7–8.
- Gutrich JJ, VanGelder E, Loope LL (2007) Potential economic impact of introduction and spread of the red imported fire ant, *Solenopsis invicta*, in Hawaii. *Environmental Science & Policy* 10: 685–696.
- Haeselbarth E (2008) On the Braconid genus *Perilitus* Nees 1818. 3rd Contribution: The species with the first segment of the *cubitus* estinguished (Hymenoptera, Braconidae). *Linzer Biologische Beiträge* 40: 1013–1152.
- Hagvar ER, Hofsvang T, Trandem N (1994) The leafminer *Chromatomyia fuscula* (Diptera: Agromyzidae) and its parasitoid complex in Norwegian barley fields. *Norwegian Journal of Agricultural Sciences, Supplement* 16: 369–378.
- Hansson C (1985) Taxonomy and biology of the Palaearctic species of *Chrysocharis* Forster, 1856 (Hymenoptera: Eulophidae). *Entomologica Scandinavica (supplement)* 26: 1–130.
- Haxaire J, Bouquet JP, Tamisier JP (2006) *Vespa velutina* Lepeletier, 1836, une redoutable nouveauté pour la Faune de France (Hym., Vespidae). *Bulletin de la Société entomologique de France* 111: 194.
- Hayes AJ (1982) *Sirex cyaneus* new record in South Scotland UK with notes on the scottish Siricidae (Hymenoptera). *Entomologist's Monthly Magazine* 118: 195–198.
- Hedqvist K-J (2003) Katalog över svenska Chalcidoidea. *Entomologisk Tidskrift* 124: 101.
- Hedstrom L (1987) Swedish insect records, Report 3. *Entomologisk Tidskrift* 108: 149–158.
- Heimpel GE, de Boer JG (2008) Sex determination in the Hymenoptera. *Annual Review of Entomology* 53: 209–230.
- Heinze J (1986) A New find of *Paratrechina longicornis* Latreille 1802 on the Azores Portugal (Hymenoptera Formicidae). *Bocagiana* 101: 1–3.
- Heinze J, Trenkle S (1997) Male polymorphism and gynandromorphs in the ant *Cardiocondyla emeryi*. *Naturwissenschaften* 84: 129–131.
- Hellrigl K (1984) The blue wood wasp *Sirex cyaneus* F. (Hym., Siricidae) and the dark Spruce beetle *Serropalpus barbatus* Schall (Col. Serropalpidae) as technical pests in Silver firs in South Tyrol. *Anzeiger für Schadlingskunde Pflanzenschutz Umweltschutz* 57: 33–35.
- Hernández-Suárez E, Carnero A, Aguiar A, Prinsloo G, LaSalle J, et al. (2003) Parasitoids of whiteflies (Hymenoptera: Aphelinidae, Eulophidae, Platygastriidae; Hemiptera: Aleyrodidae) from the Macaronesian archipelagos of the Canary Islands, Madeira and the Azores. *Systematics and Biodiversity* 1: 55–108.
- Herting B (1971) Arachnida to Heteroptera. A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy. 1: Commonwealth Agricultural Bureaux, Slough, England v+129 pp.
- Herting B (1972) Homoptera. A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy. 2: Commonwealth Agricultural Bureaux, Slough, England pp.

- Herting B (1975) Lepidoptera, Part 1 (Microlepidoptera). A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy. 6: Commonwealth Agricultural Bureaux, Commonwealth Institute of Biological Control pp.
- Herting B (1977) Hymenoptera. A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy. 4: pp.
- Herting B (1978) Neuroptera, Diptera, Siphonaptera. A catalogue of parasites and predators of terrestrial arthropods. Section A. Host or Prey/Enemy: Commonwealth Agricultural Bureaux, Commonwealth Institute of Biological Control 156 pp.
- Hoffer A (1970) First contribution to the knowlege of the Yugoslavian Encyrtidae (Hym., Chalcidoidea). *Studia Entomologica Forestalia* 1(10): 151–170.
- Hoffer A (1982) Encyrtidae des Nationalparkes Mljet 3. Beitrag zur kenntnis der Arten der Familie Encyrtidae (Hymenoptera, Chalcidoidea) Jugoslawiens. *Acta Entomologica Jugoslavica* 18: 35–63.
- Högmo (2003) Algunas especies de hormigas nuevas o interesantes para Gran Canaria, islas Canarias (Hymenoptera, Formicidae). *Vieraea* 31: 197–200.
- Hogmo O (2003) Some new or interesting ants species from Gran Canaria, Canary Islands (Hymenoptera, Formicidae). *Vieraea* 31: 197–200.
- Holusa J, Liska J, Modlinger R, Vele A (2007) On the occurrence of web-spinning sawflies of the genus *Cephalcia* (Hymenoptera, Pamphiliidae) in the Czech Republic. *Journal of Forest Science* 53: 57–62.
- Holway DA, Lach L, Suarez AV, Tsutsui ND, Case TJ (2002) The causes and consequences of ant invasions. *Annual Review of Ecology and Systematics* 33: 181–233.
- Howard LO (1895) Revision of the Aphelininae of North America a subfamily of hymenopterous parasites of the family Chalcididae. *Technical Series, Bureau of Entomology, United States Department of Agriculture* 1: 1–44.
- Howard LO (1896) The grass and grain joint-worm flies and their allies: a consideration of some north American phytophagic Eurytominae. *Bulletin. United States Department of Agriculture. Division of Entomology (Technical Series)* 2: 1–24.
- Howard LO (1912) The activity of *Prospaltella berlesei* Howard against *Diaspis pentagona* Targ. in Italy. *Journal of Economic Entomology* 5: 325–328.
- Huber JT (1986) Systematics, biology, and hosts of the Mymaridae and Mymarommatidae (Insecta: Hymenoptera): 1758–1984. *Entomography* 4: 185–243.
- Hunter MS, Woolley JB (2001) Evolution and behavioral ecology of heteronomous aphelinid parasitoids. *Annual Review of Entomology* 46: 251–290.
- Ikeda E (1996) Revision of the Japanese species of *Chrysocharis* (Hymenoptera, Eulophidae), III. *Japanese Journal of Entomology* 64: 551–569.
- Ings TC, Raine NE, Chittka L (2005) Mating preference in the commercially imported bumblebee species *Bombus terrestris* in Britain (Hymenoptera : Apidae). *Entomologia Generalis* 28: 233–238.
- Ings TC, Ward NL, Chittka L (2006) Can commercially imported bumble bees out-compete their native conspecifics? *Journal of Applied Ecology* 43: 940–948.
- Inserra S (1971) The acclimatization, spread and biology of *Aphytis melinus* in eastern Sicily (in Italian). *Tecnica Agricola* 23: 937–941.

- Jachym M (2007) Web-spinning sawflies of the genus *Cephalcia* Panzer (Hymenoptera, Pamphiliidae) in the *Picea abies* forests of the Beskid Mountains (Poland). *Journal of Forest Science* 53: 63–68.
- Janssen M (1961) Pigment modification und neuer Fundort von *Aphelinus semiflavus* How. (Hymenoptera: Chalcidoidea). *Beiträge zur Entomologie* 11: 671–678.
- Japoshvili GO, Noyes JS (2006) New data on the European fauna of encyrtid wasps (Hymenoptera, Chalcidoidea, Encyrtidae). *Entomologicheskoe Obozrenie* 85: 224.
- Jensen AB, Palmer KA, Boomsma JJ, Pedersen BV (2005) Varying degrees of *Apis mellifera ligustica* introgression in protected populations of the black honeybee, *Apis mellifera mellifera*, in northwest Europe. *Molecular Ecology* 14: 93–106.
- Jensen TS, Ochsner P (1999) Indigenous and introduced seed chalcids in Denmark — with a revised key to the Danish species (Hymenoptera: Torymidae). *Entomologiske Meddelelser* 67: 47–56.
- Jones CG, Lawton JH, Shachak M (1994) Organisms as ecological engineers. *Oikos* 69: 373–386.
- Jones RA (1997) *Hypoponera punctatissima* (Roger) (Hymenoptera: Formicidae) in South-East London. *British Journal of Entomology and Natural History* 10: 256.
- Jonsson M, Wratten SD, Landis DA, Gurr GM (2008) Recent advances in conservation biological control of arthropods by arthropods. *Biological Control* 45: 172–175.
- Jucker C, Rigato F, Regalin R (2008) Exotic ant records from Italy (Hymenoptera, Formicidae). *Bollettino di Zoologia Agraria e Bachicoltura, Milano* 40: 99–107.
- Jussila R (1989) Ichneumonological Hymenoptera reports from Finland V. *Notulae Entomologicae* 69: 75–80.
- Kalina V (1989) Checklist of Czechoslovak Insects III (Hymenoptera). Chalcidoidea. *Acta Faunistica Entomologica Musei Nationalis Pragae* 19: 97–127.
- Kanbe Y, Okada I, Yoneda M, Goka K, Tsuchida K (2008) Interspecific mating of the introduced bumblebee *Bombus terrestris* and the native Japanese bumblebee *Bombus hypocrita sapporoensis* results in inviable hybrids. *Naturwissenschaften* 95: 1003–1008.
- Kavallieratos N, Lykouressis D (1999) Parasitoids (Hymenoptera Braconidae) emerged from aphids (Homoptera Aphidoidea) on citrus and their frequency in Greece. *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri*: 93–104.
- Kenis M, Auger-Rozenberg MA, Roques A, Timms L, Pere C, et al. (2009) Ecological effects of invasive alien insects. *Biological Invasions* 11: 21–45.
- Keremidchiev M, Ganchev G, Stefan M (1980) Biology and ecology of the egg parasite *Ooencyrtus kuwanae*. *Gorskostopanska Nauka (Forest Science)* 17(4): 57–65.
- Kfir R, Rosen D (1980) Parasites of soft scales (Homoptera, Coccidae) in Israel - An annotated list. *Journal of the Entomological Society of Southern Africa* 43: 113–128.
- Kim IK, Mendel Z, Protasov A, Blumberg D, La Salle J (2008) Taxonomy, biology, and efficacy of two Australian parasitoids of the eucalyptus gall wasp, *Leptocybe invasa* Fisher & La Salle (Hymenoptera: Eulophidae: Tetrastichinae). *Zootaxa*: 1–20.
- Kirk AA (1974) The distribution and ecology of woodwasps (Hym., Siricidae) and their parasitoid, *Rhyssa persuasoria* (L.) (Hym., Ichneumonidae), in Ireland. *Entomologist's Monthly Magazine* 110: 215–221.

- Kirk AA, Lacey LA, Roditakis N, Brown JK (1993) The status of *Bemisia tabaci* (Hom.: Aleyrodidae), *Trialeurodes vaporariorum* (Hom.: Aleyrodidae) and their natural enemies in Crete. *Entomophaga* 38: 405–410.
- Klotz JH, Klotz SA, Pinnas JL (2009) Animal bites and stings with anaphylactic potential. *Journal of Emergency Medicine* 36: 148–156.
- Kluger J (1983) The males of *Cardiocondyla* Emery (Hymenoptera: Formicidae) with the description of the winged male of *Cardiocondyla wroughtoni* (Forel). *Israel Journal of Entomology* 17: 1–21.
- Kluger J (1988) The zoogeography of Israel. 9. The zoogeography of social insects of Israel and Sinai. *Monographiae Biologicae* 62: 251–275.
- König E, Bogenschütz H (1971) Zur Bekämpfung des Kiefernknospentriebwicklers im ober-rheinischen Tiefland mit und ohne DDT. *Allgemeine Forst- und Jagdzeitung* 142: 179–184.
- Koponen M, Askew RR (2002) Chalcids from Madeira, Canary Islands and Azores (Hymenoptera, Chalcidoidea). *Vieraea* 30: 117.
- Koscińska MK (1963) Investigation upon trophamnion *Ageniaspis fuscicollis* Dalm. (Chalcidoidea, Hymenoptera) (in Polish with English summary). *Studia Societatis Scientiarum Torunensis, Torun-Polonia (E)* 6(7): 1–9.
- Kowalska T (1969) The introduction of *Encarsia formosa*, the whitefly parasite in glasshouses in Poland. *Biuletyn Instytutu Ochrony Roslin* 44: 341–352.
- Kozarazhevskaya E, Mihajlovic L (1983) Biological data of mulberry scale (*Pseudaulacaspis pentagona* Targ.-Tozz.) and its parasites (Chalcidoidea) in Belgrade. *Zastita Bilja* 34: 59–75.
- Krambais A, Kotziosis A (1980) Establishment of *Leptomastix dactylopii* (How.) in Cyprus. *Fruits, Paris* 35: 783–785.
- Kristjansson K, Rasmussen K (1990) Pollination of the sweet pepper (*Capsicum annum* L.) with the solitary bee *Osmia cornifrons* (Radoszkowski). *Acta Horticulturae* 288: 173–179.
- Kuhlmann U (1994) Spatial use by *Ageniaspis fuscicollis* of patchily distributed apple ermine moths *Yponomeuta malinellus*. *Norwegian Journal of Agricultural Sciences, Supplement* 16: 337–345.
- Labeyrie V (1957) Remarque sur la mise au point d'un élevage semi-industriel de *Macrocentrus ancyliivorus* Roh. *Entomophaga* 2: 271–281.
- Lach L, Thomas ML (2008) Invasive ants in Australia: documented and potential ecological consequences. *Australian Journal of Entomology* 47: 275–288.
- Lacordaire AI, Dussart C (2008) IBP in tomatoes: *Verticillium lecanii* in early application against whitefly. *PHM Revue Horticole*: 26–31.
- LaSalle J, Gauld ID (1993) Hymenoptera: their diversity, and their impact on the diversity of other organisms. In: LaSalle J, Gauld ID (Eds) *Hymenoptera and Biodiversity*. Wallington, UK: CAB International, 1–26.
- Laudonia S, Viggiani G (1986) Natural enemies of the Citrophilus mealybug *Pseudococcus calceolariae* Mask. in Campania, Italy. *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 43: 167–172.
- Laudonia S, Viggiani G (1986) Observations on the developmental stages of *Edovum puttleri* Grissell (Hymenoptera: Eulophidae), an egg-parasitoid of colorado potato beetle. *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 43: 97–103.

- Laudonia S, Viggiani G, Rotundo G (1991) Morphobiological data on *Telenomus busseolae* Gahan (Hymenoptera: Scelionidae), oophagous parasitoid of *Sesamia nonagrioides* (Lefevre) (Lepidoptera: Noctuidae) introduced in Italy. *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 48: 125–136.
- Lenteren JCv, Nell HW, Sevenster vdL, Woets J (1976) The parasite-host relationship between *Encarsia formosa* (Hymenoptera: Aphelinidae) and *Trialeurodes vaporariorum* (Homoptera: Aleyrodidae): I. Host finding by the parasite. *Entomologia Experimentalis et Applicata* 20: 123–130.
- Leston AD (1988) Noteworthy Symphyta from afforested areas in Northern Ireland. *Irish Naturalists' Journal* 22: 445–447.
- Liao DX, Li XL, X-F P, Chen TL (1987) Hymenoptera: Chalcidoidea (1): Economic Insect Fauna of China, 34 pp.
- Limonta L, Colombo M (2003) Record of *Pheidole megacephala* (F.), *Pheidole nodus* Smith and *Tetramorium bicarinatum* Nylander (Hymenoptera Formicidae), tropical species, in nursery imported plants. *Bollettino di Zoologia Agraria e Bachicoltura, Milano* 35: 287–289.
- Linden van der A (1986) Addition of the exotic leaf miner parasites *Chrysocharis parksi* and *Opius dimidiatus* to the native Dutch parasite complex on tomato. *Mededelingen van de Faculteit Landbouwwetenschappen, Rijksuniversiteit Gent* 51: 1009–1016.
- Lindqvist E (1974) Taxonomic observations on several sawflies, Part 2. *Notulae Entomologicae* 54: 17–22.
- Liotta G (1974) Essais d'élevage d'*Aphytis chilensis* How. (Hym. Aphelinidae). *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique* 3: 83–88.
- Liotta G, Agro A, Pinto MI (2003) Biological control in citrus groves in the last 50 years: three successful cases in western Sicily. *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique* 26: 171–173.
- Liotta G, Salvia F (1991) Notizie bio-etologiche su *Comperiella bifasciata* How. (Hymenoptera: Encyrtidae) introdotta in Italia per il controllo di *Aonidiella aurantii* (Mask.) (Homoptera: Diaspididae). *Atti Congresso Nazionale Italiano di Entomologia* 16: 375–383.
- Lo Verde G (2002) Ritrovamento in Italia di *Josephiella microcarpae* Beardsley & Rasplus (Hymenoptera Agaonidae) galligeno fogliare di *Ficus microcarpa* L. (Moraceae). *Naturalista Sicilia* 26: 199–203.
- Lo Verde G, Porcelli F, Sinacori A (1991) Presenza di *Parapristina verticillata* (Waterst.) e *Odontofroggattia galili* Wiebes (Hymenoptera: Chalcidoidea Agaonidae) in Sicilia. *Atti Congresso Nazionale Italiano di Entomologia* 16: 139–143.
- Longino JT, Cox DJ (2009) *Pheidole bilimeki* reconsidered (Hymenoptera: Formicidae). *Zootaxa* 1985: 34–42.
- Longo S, Benfatto D (1982) Utilizzazione di *Leptomastix dactylopii* How. per la lotta biologica al cotonello degli agrumi in Sicilia orientale. *Informatore Agrario* 38: 19671–19672, 19675–19676.
- Longo S, Palmeri V, Sommariva D (1993) Sull'attività di *Avetianella longoi* ooparasoide di *Phoracantha semipunctata* nell'Italia Meridionale. *Redia* 76(1): 223–239.
- Loomans AJM, Tolsma J, Heest JPNFv, Fransen JJ (1995) Releases of parasitoids (*Ceranisus* spp.) as biological control agents of western flower thrips (*Frankliniella occidentalis*) in ex-

- perimental greenhouses. *Mededelingen Faculteit Landbouwkundige en Toegepaste Biologische Wetenschappen Universiteit Gent* 60: 869–877.
- Lotfalizadeh H, Delvare G, Rasplus JY (2007) Phylogenetic analysis of Eurytominae based on morphological characters (Chalcidoidea: Eurytomidae). *Zoological Journal of the Linnean Society* 151: 441–510.
- Louda SM, Pemberton RW, Johnson MT, Follett PA (2003) Nontarget effects - 'The Achilles' Heel of biological control? Retrospective analyses to reduce risk associated with biocontrol introductions. *Annual Review of Entomology* 48: 365–396.
- Luppino P (1979) Lotta biologica per la difesa degli agrumeti: si controlla il *Planococcus citri* utilizzando il *Leptomastix dactylopii*. *Informatore Agrario* 35: 4183–4186.
- Lynch LD, Thomas MB (2000) Nontarget effects in the biocontrol of insects with insects, nematodes and microbial agents: the evidence *Biocontrol News and Information* 21: 117N–130N.
- Lyytikäinen-Saarenmaa P, Tomppo E (2002) Impact of sawfly defoliation on growth of Scots pine *Pinus sylvestris* (Pinaceae) and associated economic losses. *Bulletin of Entomological Research* 92: 137–140.
- Magis N (1988) Mise à jour du catalogue des Pamphilidae observés en Belgique et dans les pays limitrophes : Hyménoptères, Symphytes. *Notes fauniques de Gembloux* 16: 1–48.
- Mailleux AC, Roques A, Molenberg JM, Gregoire JC (2008) A North American invasive seed pest, *Megastigmus spermatrophus* (Wachtl) (Hymenoptera : Torymidae): Its populations and parasitoids in a European introduction zone. *Biological Control* 44: 137–141.
- Maini S, Bellini R (1991) Biological control of filth flies in poultry houses by *Spalangia cameroni* Perkins (Hymenoptera: Pteromalidae). *Bollettino dell'Istituto di Entomologia "Guido Grandi" della Università degli Studi di Bologna* 45: 61–72.
- Malausa JC (1999) Un espoir face aux pullulations de *Metcalfa pruinosa*. Introduction en France de *Neodryinus typhlocybae*, parasite larvaire de cette 'cicadelle'. *Phytoma* 512: 37–40.
- Malausa JC, Girardet N (1997) Biological control of the blue gum psyllid. Acclimatization on the Cote d'Azur of a promising beneficial, *Psyllaephagus pilosus*. *Phytoma* 50: 49–51.
- Malausa JC, Giuge L, Fauvergue X (2003) Acclimatation et dispersion en France de *N. typhlocybae* (Ashmead) (Hymenoptera, Dryinidae) introduit pour lutter contre *Metcalfa pruinosa* (Say) (Hemiptera, Flatidae). *Bulletin de la Société entomologique de France* 108: 97–102.
- Malausa JC, Rabasse JM, Kreiter P (2008) Les insectes entomophages d'intérêt agricole acclimatés en France métropolitaine depuis le début du 20ème siècle. *Bulletin OEPP* 38: 136–146.
- Malenotti E (1917) *Prospaltella fasciata* Malen. n. sp. *Redia* 12: 195.
- Maniglia G, Agro A, Peri E (1995) Parasite activity of *Encarsia herndoni* (Girault) (Hym. Aphelinidae) on *Lepidosaphes gloverii* (Packard) (Hom. Diaspididae). *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique* 18: 131–135.
- Manzano MR, van Lenteren JC, Cardona C (2002) Searching and oviposition behaviour of *Amitus fuscipennis*, a parasitoid of the greenhouse whitefly. *Zeitschrift für Angewandte Entomologie* 126: 528–533.
- Markó B (1988) Six new ant species (Hymenoptera: Formicidae) for the Romanian myrmecofauna. *Entomologica Romanica* 3: 119–123.
- Markó B, Sipos B, Csösz S, Kiss K, Boros I, et al. (2006) A comprehensive list of the ants of Romania (Hymenoptera: Formicidae). *Myrmecologische Nachrichten* 9: 65–76.

- Markovic C, Stojanovic A (2008) Finding of locust sawfly *Nematus tibialis* (Newman) (Hymenoptera, Tenthredinidae) in Serbia. *Biljni Lekar* 36: 131–135.
- Mary L (2005) Integrated biological control on roses under glass: overview of 5 years experimentation in Brittany. *PHM Revue Horticole*: 31–34.
- Mathys G, Guignard E (1962) Un allié important dans le contrôle du pou de San José: *Prospaltella perniciosi*. *Agricoltura, Roma* 1: 59–61.
- Mazzone P, Viggiani G (1983) Present status of the parasitoids of *Saissetia oleae* (Oliv.) in Italy, with preliminary biological notes on *Prococcophagus varius* Silv. and *P. saissetiae* Ann. and Myn. (Aphelinidae) recently introduced. *Atti XIII Congresso Nazionale Italiano di Entomologia*: 191–196.
- Mei M (1995) Hymenoptera Formicidae (con diagnosis di due nuove specie). *Naturalista Sicilia* 19: 753–772.
- Mendel Z, Podoler H, Rosen D (1984) Population dynamics of the mediterranean black scale, *Saissetia oleae* (Olivier), on citrus in Israel. 4. The natural enemies. *Journal of the Entomological Society of Southern Africa* 47: 3–9.
- Mendel Z, Protasov A, Fisher N, La Salle J (2004) Taxonomy and biology of *Leptocybe invasa* gen. & sp n. (Hymenoptera: Eulophidae), an invasive gall inducer on Eucalyptus. *Australian Journal of Entomology* 43: 101–113.
- Menteelos I (1967) *Eretmocerus corni* Hald. (Hym. Aphelinidae) parassita del *Siphoninus phillyreae* Halid. (Hom. Aleyrodidae). *Entomophaga* 12: 351–353.
- Mercet RG (1911) Las plagas del naranjo en Valencia. *Asociacion espanola para el progreso de las ciencias* 4: 1–17.
- Michelakis SE (1997) The citrus leafminer status in Greece. *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique* 20: 81–82.
- Michelakis SE, Vacante V (1997) The citrus leafminer status in Greece. *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique* 20: 81–82.
- Midtgaard F (1986) *Urocerus augur* Klug, 1803 and *Sirex cyaneus* Fabricius, 1781 (Hymenoptera Siricidae) new to the Danish fauna. *Entomologiske Meddelelser* 53: 127–129.
- Mifsud D (1997) Biological control in the Maltese Islands - past initiatives and future programmes. *Bulletin de l'Organisation Européenne et Méditerranéenne pour la Protection des Plantes* 27: 77–84.
- Mihajlovic L (1983) *Bruchophagus sophorae* Crosby & Crosby (Chalcidoidea: Eurytomidae), nova ursta za faunu Jugoslavije. *Zastita Bilja* 34: 419–426.
- Mihalache G, Ciornei C, Tomescu R (1995) The role of parasitoid and predatory insects in limiting the outbreak of gypsy moth (*Lymantria dispar*) in the oak stands of Romania. *Biological and integrated forest protection*: 157–170.
- Milanovic S, Krnjajic S, Mihajlovic L (1998) A contribution to the study of gypsy moth egg parasitoids (*Lymantria dispar* L.) in Yugoslavia. *Acta Entomologica Serbica* 3: 127–137.
- Mineo G (1981) Studies on the Scelionidae (Hym. Proctotrupoidea) XIII. A revision of the Palearctic species of *Gryon* Haliday: the *muscaeformis* group. *Redia* 64: 117–147.
- Mineo G, Viggiani G (1976) Sull'acclimatazione in Italia di *Leptomastix dactylopii* How. parassita del cotonella degli agrumi. *Informatore Fitopatologico* 26(5): 13–15.

- Mitroiu MD (2001) Revision of the Chalcidoidea: Pteromalidae (Hymenoptera) collections of the Belgian Royal Institute of Natural Sciences and the discovery of 31 new species for Belgium. *Bulletin de la Société Royale Belge d'Entomologie* 137: 91–97.
- Monaco R (1976) Nota su *Metaphycus lounsburyi* (How.) (Hym.-Encyrtidae) parassita di *Saissetia oleae* (Oliv.). *Entomologica* 12: 143–151.
- Monaco R, D'Abbicco M (1987) Osservazioni biologiche sulla *Saissetia coffeae* Walk. (Rhynchota - Hom. - Coccidae) su fico (*Ficus carica* L.). *Entomologica* 22: 75–85.
- Monastero S (1962) The coccids of *Citrus* in Sicily (*Lepidosaphes beckii*, *Parlatoria ziziphus*, *Coccus hesperidum*, *Pseudococcus adonidum*, *Saissetia oleae*, *Ceroplastes rusci* (3rd note) *Bollettino dell'Istituto di Entomologia Agraria e dell'Osservatorio di Fitopatologia di Palermo* 28: 1–87.
- Montiel A, Santaella S (1995) Evolucion de la poblacion de *Saissetia oleae* Oliv en condiciones naturales. Periodos susceptibles de control biologico. *Boletín de Sanidad Vegetal Plagas* 21: 445–455.
- Moscaliuc L (2009) Notes on the distribution of the genus *Plagiolepis* Mayr, 1861 (Hymenoptera: Formicidae) in Dobrogea, and the first record of *Plagiolepis obscuriscapa* Santschi, 1923 in Romania. *Travaux du Museum National d'Histoire Naturelle Grigore Antipa* 52: 297–301.
- Murphy NP, Carey D, Castro LR, Downton M, Austin AD (2007) Phylogeny of the platygastroid wasps (Hymenoptera) based on sequences from the 18S rRNA, 28S rRNA and cytochrome oxidase I genes: implications for the evolution of the ovipositor system and host relationships. *Biological Journal of the Linnean Society* 91: 653–669.
- Nénon JP (1978) Synécologie d'*Ageniaspis fuscicollis* Thoms. (Hyménoptère Chalcidien polyembryonnaire) parasitoïde des Hyponomeutes (Lépidoptères). *Annales de Zoologie - Ecologie Animale* 10: 525–544.
- Neuffer G (1962) Zur Zucht und Verbreitung von *Prospaltella perniciosi* Tower (Hymenoptera, Aphelinidae) und anderen Parasiten der San-Jose-Schildlaus (*Quadraspidiotus perniciosus* Comstock: Homoptera, Diaspidinae) in Baden-Württemberg. *Nachrichtenblatt des Deutschen Pflanzenschutzdienstes* 14: 97–101.
- Neuffer G (1968) The effectiveness of the aphelinid, *Prospaltella perniciosi* Tower in the part of southwestern Germany infested by the San José scale, *Quadraspidiotus perniciosus* (in German with English summary). *Anzeiger für Schadlingskunde Pflanzenschutz Umweltschutz* 41(7): 97–101.
- Neumeyer R (2008) Ergänzungen zur Artenliste der frei lebenden Ameisen (Hymenoptera: Formicidae) in der Schweiz. *Entomo Helvetica* 1: 43–48.
- Nijhof BW, Oudman L, Torres R, Garrido C (2000) The introduction of *Encarsia guadeloupae* (Hymenoptera, Aphelinidae) for control of *Aleurodicus dispersus* and *Lecanoides floccissimus* (Homoptera, Aleyrodidae) in Tenerife. *Proceedings of the Section Experimental and Applied Entomology of the Netherlands Entomological Society* 11: 41–47.
- Noguera V, Verdu MJ, Gomez Cadenas A, Jacas JA (2003) Life cycle, dynamics and natural enemies of *Saissetia oleae* Olivier (Homoptera: Coccidae) in olive orchards in Alto Palancia (Castellon-Spain). *Boletín de Sanidad Vegetal Plagas* 29: 495–504.
- Nowicki S (1940) Description of new genera and species of the family Trichogrammatidae (Hym. Chalcidoidea) from the Palaearctic region, with notes. Supplement. *Zeitschrift für Angewandte Entomologie* 26: 624–663.

- Noyes JS (1988) *Copidosoma truncatellum* (Dalman) and *C. floridanum* (Ashmead) (Hymenoptera, Encyrtidae), two frequently misidentified polyembryonic parasitoids of caterpillars (Lepidoptera). *Systematic Entomology* 13: 197–204.
- Noyes JS, Hayat M (1994) Oriental mealybug parasitoids of the Anagyrini (Hymenoptera: Encyrtidae). Oxon, UK CAB International. 554 pp.
- Nunez-Bueno L (1982) *Trybliographa daci* Weld (Hymenoptera: Cynipoidae): Biology and aspects of the relationship with its host *Anastrepha suspensa* (Loew) (Diptera: Tephritidae).
- Nyman T, Farrell BD, Zinovjev AG, Vikberg V (2006) Larval habits, host-plant associations, and speciation in nematine sawflies (Hymenoptera : Tenthredinidae). *Evolution* 60: 1622–1637.
- Ochsner P (1998) *Seed chalcids (Megastigmus spp.) associated with firs (Abies spp.)*. PhD thesis, University of Aarhus, Denmark.
- Ofek G, Huberman G, Yzhar Y, Wysoki M, Kuzlitzky W, et al. (1997) The control of the oriental red scale, *Aonidiella orientalis* Newstead and the California red scale, *A. aurantii* (Maskell). *Alon Ha'notea* 51: 212–218.
- OILB (1971) Liste d'identification des entomophages. *OILB, Genève* 8: 28.
- Olafsson E (1979) A review of the species of the family Vespidae (Hymenoptera) recorded in Iceland. *Natturufraedingurinn* 49: 27–40.
- Oncuer C (1974) The *Coccus* species (Homoptera: Coccidae) damaging *Citrus* groves in the Aegean region; studies on their morphological characters, distribution and natural enemies. *Bitki Koruma Bulteni*: 59 pp.
- Onillon JC (1969) A propos de la présence en France d'une nouvelle espèce d'aleurode nuisible aux citrus, *Aleurothrixus floccosus* Maskell (Homoptera; Aleurodidae). *Comptes Rendus des Séances de l'Académie d'Agriculture de France* 55: 937–940.
- Onillon JC (1973) Possibilités de régulation des populations d'*Aleurothrixus floccosus* Mask. (Homopt. Aleurodidae) sur agrumes par *Cales noacki* How. (Hymenopt. Aphelinidae). *Bulletin de l'Organisation Européenne et Méditerranéenne pour la Protection des Plantes* 3: 17–26.
- Orphanides GM (1988) Current status of biological control of the black scale, *Saissetia oleae* (Olivier), in Cyprus. *Technical Bulletin - Agricultural Research Institute, Cyprus*: 8 pp.
- Orphanides GM (1996) Establishment of *Comperiella bifasciata* (Hym.: Encyrtidae) on *Aonidiella aurantii* (Hom.: Diaspididae) in Cyprus. *Entomophaga* 41(1): 53–57.
- Ortu S, Prota R (1983) Results from integrated control trials of citrus pests in Sardinia. *10th International Congress of Plant Protection 1983. Volume 3. Proceedings of a conference held at Brighton, England, 20–25 November, 1983. Plant protection for human welfare.*: 1022.
- Pagliano G, Scaramozzino P, Strumia F (2000) Introduction and spread of four aculeate Hymenoptera in Italy, Sardinia and Corsica. In Austin AD, Dowton M (eds). *Hymenoptera. Evolution, biodiversity and biological control*. Collinwood, Australia: CSIRO Publishing, 290–295.
- Panis A (1977) Variabilité infraspécifique chez *Metaphycus lounsburyi* Howard (Hymenoptera, Chalcidoidea, Encyrtidae). *Annales de Zoologie - Écologie Animale* 9: 577.
- Panis A (1981) Note sur quelques insectes auxiliaires régulateurs des populations de Pseudococcidae et de Coccidae (Homoptera, Coccoidea) des agrumes en Provence orientale. *Fruits, Paris* 36: 49–52.

- Panis A (1983) Biological control of the black scale *Saissetia oleae* (Olivier) in the context of integrated control in French olive cultivation. *Symbioses* 15: 63–74.
- Panis A, Carrero JM, Limon F (1977) Biological note on the entomofauna of citrus trees in Spain. *Anales del Instituto Nacional de Investigaciones Agrarias (Serie Protección Vegetal)*: 139–143.
- Panis A, Marro JP (1978) Variation du comportement chez *Metaphycus lounsburyi* (Hym.: Encyrtidae) (in French). *Entomophaga* 23: 9–18.
- Panis A, Pinet C (1999) A discussion of some ecological factors affecting *Coccidencyrtus malloi* Blanchard (Hymenoptera: Encyrtidae) as a parasitoid of diaspidid scales under glass in France. *Entomologica* 33: 419–422.
- Panis A, Pinet C (1999) A study of two *Plagiomerus* species (Hymenoptera: Encyrtidae) parasitising diaspidid scales (Coccoidea) in glasshouses in France. *Entomologica* 33: 423–427.
- Papadopoulos NT, Katsoyannos BI (2003) Field parasitism of *Ceratitis capitata* larvae by *Aganaspis daci* in Chios, Greece. *BioControl* 48: 191–195.
- Pappas S, Viggiani G (1979) Introdotta a Corfù la *Prospaltella lahorensis* How, (Hym. Aphelinidae), parassita del *Dialeurodes citri* (Ashm.) (Hom. Aleyrodidae). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 36: 38–41.
- Paraskakis M, Neuenschwander P, Michelakis S (1980) *Saissetia oleae* (Oliv) (Hom. Coccidae) and its parasites on olive trees in Crete, Greece. *Zeitschrift für Angewandte Entomologie* 90: 450–464.
- Peck O (1963) A catalogue of the Nearctic Chalcidoidea (Insecta: Hymenoptera). *Canadian Entomologist (Supplement)* 30: 1–1092.
- Pedata PA, Viggiani G (1993) Note su *Encarsia transvena* Timberlake (Hymenoptera: Aphelinidae) parasitoide di aleirodidi nuovo per l'Italia (in Italian with English summary). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 48: 241–244.
- Pedersen BV (1996) On the phylogenetic position of the Danish strain of the black honeybee (the Laeso bee), *Apis mellifera mellifera* L (Hymenoptera: Apidae) inferred from mitochondrial DNA sequences. *Entomologica Scandinavica* 27: 241–250.
- Pennacchio F (1989) The Italian species of the genus *Aphidius* Nees Hymenoptera Braconidae Aphidiinae. *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 46: 75–106.
- Pesenko YA, Astafurova YV (2003) Annotated Bibliography of Russian and Soviet publications on the bees (Hymenoptera: Apoidea; excluding *Apis mellifera*): 1771–2002. *Denisia*: 3–616.
- Pettersen H (1976) Parasites (Hym., Chalcidoidea) associated with bark beetles in Norway. *Norwegian Journal of Entomology* 23: 75–77.
- Phillips DS (1997) *Delomerista novita* (Cresson) and *D. pfankuchi* (Brauns) (Hym., Ichneumonidae) new to Scotland. *Entomologist's Monthly Magazine* 133: 8.
- Piekarczyk J, Wright A (1988) Recent additions to the Sawfly fauna of Warwickshire, England UK. *Entomologist's Monthly Magazine* 124: 200.
- Pimentel D, Lach L, Zuniga R, Morrison D (2000) Environmental and economic costs of nonindigenous species in the United States. *Bioscience* 50: 53–65.
- Pimentel D, Zuniga R, Morrison D (2005) Update on the environmental and economic costs associated with alien- invasive species in the United States. *Ecological Economics* 52: 273–288.

- Pina T, Martinez B, Verdu MJ (2001) Presence in the Iberian Peninsula of *Comperiella lemniscata* (Hym.: Encyrtidae) on the red citrus scale *Chrysomphalus dictyospermi* (Hemiptera: Diaspididae). *Boletín de Sanidad Vegetal, Plagas* 27: 29–34.
- Pintureau B (2008) Les espèces européennes de Trichogrammes: ILV Edition pp.
- Pintureau B, Fabre JP, Oliveira ML (1991) Study of two forms of *Megastigmus suspectus* Borries (Hym. Torymidae). *Bulletin de la Société entomologique de France* 95: 277–289.
- Podoler H, Mazor M (1981) *Dirhinus giffardii* Silvestri (Hym.: Chalcididae) as a parasite of the mediterranean fruit fly, *Ceratitis capitata* (Wiedmann) (Dip.: Tephritidae). 2. Analysis of parasite responses. *Acta Oecologica, Oecologia Applicata* 2: 299–309.
- Polaszek A, Abd-Rabou S, Huang J (1999) The Egyptian species of *Encarsia* (Hymenoptera: Aphelinidae): a preliminary review. *Zoologische Mededelingen* 73: 16.
- Popescu IE (2004) Eurytomid wasps (Hymenoptera, Chalcidoidea, Eurytomidae) new for Romanian fauna (II). *Analele Științifice ale Universității "Al.I. Cuza" Iași, s. (Biologie Animală)* 50: 97–102.
- Popescu IE, Fusu L (2003) Eurytomid wasps (Hymenoptera, Chalcidoidea, Eurytomidae) new for Romanian fauna. *Analele Științifice ale Universității "Al.I. Cuza" Iași, s. (Biologie Animală)* 49.
- Popovici O (2005) New Scelionidae species (Hymenoptera, Platygastroidea, Scelionidae) for Romanian fauna. *Analele Științifice ale Universității "Al.I. Cuza" Iași, s. (Biologie Animală)* 51: 15–17.
- Porchinsky IA (1881) Vnov otkrytye vrednye nasekomye v rossii i otchet po obsledovaniyu solomy iz raznikh mestnostey khersonskoy gub., postradavshikh ot neurozhaya. pp.24 St Petersburg.
- Priore R, Viggiani G (1965) La *Contarinia sorghicola* Coq. (Diptera Cecidomyiidae) ed i suoi parassiti in Italia. *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 23: 1–36.
- Protasov A, Blumberg D, Brand D, La Salle J, Mendel Z (2007) Biological control of the eucalyptus gall wasp *Ophelimus maskelli* (Ashmead): Taxonomy and biology of the parasitoid species *Closterocerus chamaeleon* (Girault), with information on its establishment in Israel. *Biological Control* 42: 196–206.
- Protasov A, La Salle J, Blumberg D, Brand D, Saphir N, et al. (2007) Biology, revised taxonomy and impact on host plants of *Ophelimus maskelli*, an invasive gall inducer on *Eucalyptus* spp. in the Mediterranean area. *Phytoparasitica* 35: 50–76.
- Protasov A, Doganlar M, La Salle J, Mendel Z (2008) Occurrence of Two Local *Megastigmus* Species Parasitic on the *Eucalyptus* Gall Wasp *Leptocybe invasa* in Israel and Turkey. *Phytoparasitica* 36: 449–459.
- Prys-Jones O, Olafsson E, Kristjansson K (1981) The Icelandic bumble bee fauna (*Bombus* Latr., Apidae) and its distributional ecology. *Journal of Apiculture Research* 20: 189–197.
- Pschorn Walcher H (1991) Development and diapause of different European provenances of the pine sawfly *Neodiprion sertifer* (Geoff.) (Hym., Diprionidae) under identical outdoor conditions. *Journal of Applied Entomology* 112: 382–388.
- Pschorn-Walcher H, Zinnert KD (1971) On the larval taxonomy, distribution and ecology of the European sawflies. *Zeitschrift für Angewandte Entomologie* 68: 345–366.
- Quilis Pérez M (1931) Especies nuevas de Aphidiidae españoles. *Eos* 17: 25–84.

- Radchenko A, Czechowski W, Czechowska W (1998) The genus *Tetramorium* Mayr (Hymenoptera, Formicidae) in Poland: A survey of species and a key for their identification. *Annales Zoologici (Warsaw)* 48: 107–118.
- Radchenko A, Czechowski W, Czechowska W (1999) *Tetramorium insolens* (F. Sm.) and *Tetramorium caldarium* (Rog.) (and not *T. guineense* (F.) and *T. simillimum* (F. Sm.)) (Hymenoptera, Formicidae) in Poland. *Przegląd Zoologiczny* 43: 105–106.
- Rahola P (2005) Observations sur la biologie de *Sceliphron curvatum* (Smith, 1870) dans le Gard (sud de la France) (Hymenoptera, Sphecidae) *Bulletin de la Société entomologique de France* 110: 390.
- Raspi A (1988) Nota preliminare sugli entomofagi di *Saissetia oleae* (Oliv.) e di *Lichtensia viburni* Sign. presenti negli-oliveti della toscana litoranea e della Liguria occidentale. *Frustula Entomologica* 11: 119–128.
- Rasplus JY (1992) Inventaire des Chalcidiens de la réserve de Scandola (Hyménoptères parasites) - Première partie. *Travaux Scientifiques du Parc Régional et Réserves Naturelles de Corse* 36: 97–108.
- Rasplus JY, Kerdelhué C, Le Clainche I, Mondor G (1998) Molecular phylogeny of fig waps (Hymenoptera). Agaonidae are not monophyletic. *Compte Rendu de l'Académie des Sciences de Paris* 321: 517–527.
- Rasplus JY, Carcreff E, Cornuet JM, Roques A, Austin AD, et al. (2000) Genetic structure of the cypress seed chalcid *Megastigmus wachtli* (Torymidae) within its Mediterranean distribution. *Hymenoptera. Evolution, biodiversity and biological control*: 114–130.
- Reichart G (1964) Comprehensive study on the pea weevil (*Bruchus pisorum*) and its control. *Kísérletügyi Közlemények* 57: 149–168.
- Remaudière G, Stary P (1993) Arrivée spontanée en région parisienne de l'hyménoptère Aphidiide *Pauesia cedrobii*, parasite du puceron du cèdre *Cedrobium laportei* *Revue Française d'Entomologie (Nouvelle Série)* 15: 157–158.
- Reyes J, Espadaler X (2005) Tres nuevas especies foraneas de Hormigas para la Peninsula Ibérica (Hymenoptera, Formicidae). *Boletín Sociedad Entomológica Aragonesa* 36: 263–265.
- Reyes Lopez JL, Luque Garcia G (2003) Nuevas citas de *Monomorium andrei* SAUNDERS, 1890 (Hymenoptera: Formicidae) para la Península Ibérica y Baleares. *Boletín de la Asociación Española de Entomología* 27: 221–222.
- Reyes-Lopez J, Ordonez-Urbano C, Carpintero-Ortega S (2008) Updated relation of alien species of Andalusia (southern Spain). *Boletín Sociedad Entomológica Aragonesa* 32: 81–94.
- Rivera AC, Carbone SS, Andres JA (1999) Life cycle and biological control of the eucalyptus snout beetle (Coleoptera, (Coleoptera, Curculionidae) by *Anaphes nitens* (Hymenoptera, Mymaridae) in north-west Spain. *Agricultural and Forest Entomology* 1: 103–109
- Rivnay T, Gerling D (1987) Aphelinidae parasitoids (Hymenoptera Chalcidoidea) of whiteflies (Hemiptera: Aleyrodidae) in Israel, with descriptions of three new species. *Entomophaga* 32: 463–475.
- Rizzo MC, Lo Verde G, Rizzo R, Buccellato V, Caleca V (2006) Sicily for biological control of *Ophelimus maskelli* Ashmead (Hymenoptera Eulophidae) invasive gall inducer on eucalypt trees. *Bollettino di Zoologia Agraria e Bachicoltura, Milano* 38: 237–248.

- Roll U, Dayan T, Simberloff D (2007) Non-indigenous insect species in Israel and adjacent areas. *Biological Invasions* 9: 629–643.
- Ronquist F (1995) Phylogeny and early evolution of the Cynipoidea (Hymenoptera). *Systematic Entomology* 20: 309–335.
- Roques A, Rabitsch W, Rasplus J-Y, Lopez-Vaamonde C, Nentwig W, et al. (2008) Alien terrestrial invertebrates of Europe. In DAISIE (ed.). Handbook of alien species in Europe: Invading Nature - Springer Series in Invasion Ecology, Springer-Verlag, 63–80.
- Roques A, Skrzypczynska M (2003) Seed-infesting chalcids of the genus *Megastigmus* Dalman, 1820 (Hymenoptera: Torymidae) native and introduced to the West Palearctic region: taxonomy, host specificity and distribution. *Journal of Natural History* 37: 127–238.
- Rose M, Rosen D (1992) *Eretmocerus debachi* n.sp. (Hymenoptera: Aphelinidae), an effective parasite of *Parabemisia myricae* (Homoptera: Aleyrodidae). *Israel Journal of Entomology* XXV-XXVI: 199–207.
- Rose M, Zolnerowich G (1997) *Eretmocerus* Haldeman (Hymenoptera: Aphelinidae) in the United States, with descriptions of new species attacking *Bemisia* (*tabaci* complex) (Homoptera: Aleyrodidae). *Proceedings of the Entomological Society of Washington* 99: 1–27.
- Rosen D (1962) An annotated list of hymenopterous parasites of citrus soft scale in Israel. *Entomophaga* 7: 349–357.
- Rosen D (1965) The hymenopterous parasites of citrus armored scale in Israel (Hym. Chalcidoidea). *Annals of the Entomological Society of America* 58: 388–398.
- Rosen D (1974) Current status of integrated control of *Citrus* pests in Israel. *Bulletin OEPP* 4: 363–368.
- Rosen D, Alon A (1983) Taxonomic and biological studies of *Diversinervus cervantesi* (Girault) (Hymenoptera: Encyrtidae) a primary parasite of soft scale insects. *Contributions of the American Entomological Institute* 20: 336–362.
- Rosen D, DeBach P (1979) Species of *Aphytis* of the World (Hymenoptera: Aphelinidae). 801 pp.
- Roversi PF, Tiberi R, Covassi M (1991) *Ooencyrtus kuwanae* (Howard): presenza e numero di generazioni nell'Italia centrale (Hymenoptera: Encyrtidae). *Atti Congresso Nazionale Italiano di Entomologia* 16: 429–435.
- Ruschka F (1912) Über erzogene chalcididen aus der Sammlung der K.K. Landwirtschaftlich-bakteriologischen und Pflanzenschutzstation in Wien. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* 62: 238–246.
- Ruschka F (1921) Chalcididenstudien I. *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* 70: 234–315.
- Russo A, Siscaro G (1994) *Diaspis echinocacti* pest of prickly pear in Sicily. *Informatore Agrario* 50: 73–76.
- Russo A, Siscaro G, Verdone A (2000) On the presence of *Anastatus tenuipes* (Hymenoptera, Eupelmidae) in Italy. *Bollettino di Zoologia Agraria e Bachicoltura, Milano* 32: 239–243.
- Rutz DA, Axtell RC (1979) Sustained releases of *Muscidifurax raptor* (Hymenoptera: Pteromalidae) for house fly (*Musca domestica*) control in two types of caged-layer poultry houses. *Environmental Entomology* 8: 1105–1110.
- Salgueiro J (2003) Catalogo dos Formicideos de Portugal continental e ilhas. *Boletín Sociedad Entomológica Aragonesa* 31: 145–171.

- Sasso R, Laudonia S, Viggiani G (2008) Preliminary data on the biological control of *Ophelelimus maskelli* (Ashmead) (Hymenoptera: Eulophidae) in Campania after the introduction of its antagonist *Closterocerus chamaeleon* (Girault). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 62: 51–55.
- Scaramozzino PL, Pagliano G (1987) Note sulla presenza in Italia di 'Isodontia mexicana' (Sausure, 1867) (Hymenoptera, Sphecidae). *Rivista Piemontese di Storia Naturale* 8: 155–159.
- Schedl W (1974) Erster nachweis der Farnblattwespe *Blasticotoma filiceti* Klug, 1834, in Österreich (Hymenoptera: Blasticotomidae). *Zeitschrift der Arbeitsgemeinschaft Österreichischer Entomologen* 25: 114–117.
- Scheffer SJ, Grissell EE (2003) Tracing the geographical origin of *Megastigmus transvaalensis* (Hymenoptera: Torymidae): an African wasp feeding on a South American plant in North America. *Molecular Ecology* 12: 415–421.
- Schembri S, Collingwood CA (1995) The myrmecofauna of the Maltese islands. Remarks and additions. *Bollettin della Società Entomologica Italiana* 127: 153–158.
- Scheurer S, Liebig G (1998) *Tapinoma melanocephalum* Fabr. (Formicidae, Dolichoderinae) in buildings - Observations on its biology and control. *Anzeiger für Schadlingskunde Pflanzenschutz Umweltschutz* 71: 145–148.
- Schnee H, Voigt D, Kaufer B (2006) Biological control of the blue gum psyllid *Ctenarytaina eucalypti* (Maskell) (Hemiptera, Psyllidae) by the encyrtid *Psyllaephagus pilosus* Noyes (Hymenoptera, Encyrtidae) a success not only in California and Western Europe but also in Saxony. *Gesunde Pflanzen* 58: 99–106.
- Schultz R, Busch T (2009) The northernmost record of the invasive garden ant, *Lasius neglectus* (Hymenoptera: Formicidae). *Myrmecological News* 12: 183–186.
- Schwarz M (1994) Distribution of Siricidae (woodwasps), Aulacidae, Evaniidae and Masaridae (Hymenoptera) in the county of Salzburg (Austria), with a preliminary bibliography of the hymenopterous fauna of Salzburg. *Linzer Biologische Beiträge* 26: 861–871.
- Scopes NEA (1969) The economics of mass rearing *Encarsia formosa*, a parasite of the whitefly *Trialeurodes vaporariorum*, for use in commercial horticulture. *Plant Pathology* 18: 130–132.
- Šefrová H, Laštůvka Z (2005) Catalogue of alien animal species in the Czech Republic. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis* 53: 151–170.
- Seifert B (1982) *Hypoponera punctatissima* (Hymenoptera Formicidae) and interesting ant species of human settlements. *Entomologische Nachrichten und Berichte* 26: 173–175.
- Seifert B (1992) A taxonomic revision of the Palaearctic members of the ant subgenus *Lasius* s.str. (Hymenoptera: Formicidae). *Abhandlungen und Berichte des Naturkundemuseums Görlitz* 66: 1–67.
- Seifert B (1996) Ameisen: Beobachten. Bestimmen. : Naturbuch-Verlag. Augsburg. 352 pp.
- Seifert B (2000) Rapid range expansion in *Lasius neglectus* (Hymenoptera, Formicidae)- an Asian invader swamps Europe. *Deutsche Entomologische Zeitschrift* 47: 173–179.
- Seifert B (2003) The ant genus *Cardiocondyla* (Insecta: Hymenoptera: Formicidae) - a taxonomic revision of the *C. elegans*, *C. bulgarica*, *C. batesii*, *C. nuda*, *C. shuckardi*, *C. stambuloffi*, *C. wroughtonii*, *C. emeryi*, and *C. minutior* species groups. *Annalen des Naturhistorischen Museums in Wien* 104: 203–338.

- Sellenschlo U (1991) The ant *Monomorium floricola* (Jerdon 1851) (Hym Myrmicidae) imported to Germany for the 1st time. *Anzeiger für Schadlingskunde Pflanzenschutz Umweltschutz* 64: 111–115.
- Serini GB (1990) Parasitoid of *Parectopa robiniella* Clemens and *Phyllonorycter robiniellus* (Clemens) (Lepidoptera Gracillariidae). *Bollettino di Zoologia Agraria e Bachicoltura, Milano* 22: 139–149.
- Sharkey M (2007) Phylogeny and classification of Hymenoptera. *Zootaxa* 1668: 521–548.
- Shinohara A, Zombori L (2003) Records of pamphiliid sawflies (Hymenoptera) from the Ukrainian Carpathians, Poland and western Russia. *Folia Entomologica Hungarica* 64: 223–226.
- Silvestri F (1908) Appunti sulla *Prospaltella berlesei* How. e specialmente sui primi stati del suo sviluppo. *Bollettino del Laboratorio di Zoologia Generale e Agraria, della R. Scuola Superiore d'Agricoltura* 3: 22–28.
- Simberloff D, Stiling P (1996) Risks of species introduced for biological control. *Biological Conservation* 78: 185–192.
- Simoes AMA, Cecilio A, Ilharco FA, Aguiar MF, Franco JC (2006) New records of hymenopteran parasitoid species from citrus orchards in Terceira Island (Azores, Portugal). *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique* 29: 189–193.
- Simutnik SA, Pavlicek T, Nevo E (2005) The first record of *Anagyrus subflaviceps* (Hymenoptera, Encyrtidae) from Israel. *Vestnik Zoologii, Kiev* 39: 67–69, 104.
- Sinacori A, Mineo G, Mineo N (1999) Observations on the phenology of postembryonal stage of *Heliothrips haemorrhoidalis* (Bouché) (Thysanoptera) and its natural antagonists. *Phytophaga* 9 (supplemento): 53–63.
- Siscaro G (1992) *Avetianella longoi* sp.n. (Hymenoptera Encyrtidae) egg parasitoid of *Phoracantha semipunctata* F. (Coleoptera Cerambycidae). *Bollettino di Zoologia Agraria e Bachicoltura, Milano* 24: 205–212.
- Siscaro G, Barbagallo S, Longo S, Patti I (1997) First results on the biological and integrated control of citrus leafminer in Italy. *Informatore Fitopatologico* 47: 19–28.
- Siscaro G, Longo S, Maugeri V, Reina P, Zappala L (1999) Establishment in Sicily of *Ageniaspis citricola*. *Informatore Agrario* 55: 85–86.
- Siscaro G, Mazzeo G (1997) Rearing of *Ageniaspis citricola* for the biological control of *Phyllocnistis citrella*. *Informatore Agrario* 53: 61–64.
- Skovgard H, Jespersen JB (1999) Activity and relative abundance of hymenopterous parasitoids that attack puparia of *Musca domestica* and *Stomoxys calcitrans* (Diptera: Muscidae) on confined pig and cattle farms in Denmark. *Bulletin of Entomological Research* 89: 263–269.
- Skrzypczynska M (1989) Review of insects found in cones of *Abies alba* Mill in Poland. *Proceedings of the 3rd Cone and Seed Insects Working Party Conference, held in Victoria, British Columbia, Canada, on 26–30 June 1988*. 42–49.
- Skrzypczynska M, Mazurkiewicz I (2002) Insects damaging cones and seeds of European fir *Abies alba* Mill. in the selected seed stands in the Krakow Forest Region (southern Poland). *Acta Agraria et Silvicultura. Series Silvestris* 40: 67–86.

- Smits van Burgst CAL (1915) A minute Hymenopteron (*Aspidiotiphagus schoeversii* n.sp.). *Tijdschrift voor Entomologie* 58: 292.
- Sorvari J (2002) *Tapinoma melanocephalum* (Fabricius, 1793) (Hymenoptera: Formicidae), an imported ant species new to Finland, with observations and a taxonomic note. *Entomologist's Gazette* 53: 269–270.
- Speight MCD (1979) *Anoplonyx destructor*, *Hemerobius pini* and *Pamphilius hortorum*, insects new for Ireland. *Irish Naturalists' Journal* 19: 302–303.
- Spicciarelli R, Tranfaglia A, Battaglia D, Torraco R (1996) Biological control of *Aleurothrixus floccosus* with *Cales noacki*. *Informatore Agrario* 52: 67–70.
- Stansly PA, Calvo J, Urbaneja A (2005) Release rates for control of *Bemisia tabaci* (Homoptera : Aleyrodidae) biotype “Q” with *Eretmocerus mundus* (Hymenoptera : Aphelinidae) in greenhouse tomato and pepper. *Biological Control* 35: 124–133.
- Sary P (1975) *Aphidius colemanii* Viereck - its taxonomy, distribution and host range (Hymenoptera, Aphidiidae). *Acta Entomologica Bohemoslovaca* 72: 156–163.
- Sary P, Michelena JM, Melia A (1985) *Lysiphlebus testaceipes* an exotic parasite of aphids and a biological control agent in Spain (Hymenoptera Aphidiidae). *Graellsia* 41: 131–136.
- Sary P, Remaudiere G (1973) Some aphid parasites Hym., Aphidiidae from Spain. *Entomophaga* 18: 287–290.
- Sary P, Remaudière G, Leclant F (1977) New additions of French Aphidiids (Hym) and their hosts. *Annales de la Société Entomologique de France* 13: 165–184.
- Stathas GJ, Kontodimas DC (2001) Ecological data of the scale *Targionia vitis* on grapes in southern Greece. *Annales de l'Institut Phytopathologique Benaki* 19: 134–139.
- Stavraki HG (1976) Results obtained from released of the oophagous parasites *Trichogramma* spp. against *Prays oleae* Bern. (Lep. Hyponomeutidae) over a four year period in Greece. *Mededelingen van de Faculteit Landbouwwetenschappen, Rijksuniversiteit Gent* 42: 1361–1371.
- Steenis MJv (1992) Suitability of *Aphis gossypii* Glov., *Macrosiphum euphorbiae* (Thom.), and *Myzus persicae* Sulz. (Hom.: Aphididae) as host for several aphid parasitoid species (Hym.: Braconidae). *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique* 16: 157–160.
- Steffan JR (1952) Les espèces françaises du genre *Perilampus* Latr. (Hym. Perilampidae). *Bulletin de la Société entomologique de France* 57: 68–74.
- Stenseth C (1976) Use of *Encarsia formosa* Gahan (Eulophidae: Hymenoptera) for the control of the glasshouse whitefly *Trialeurodes vaporariorum* (Westw.) (Homoptera: Aleyrodidae) on tomatoes in greenhouses. *Forskning og Forsok i Landbruget* 27: 495–509.
- Stojanova AM (1997) Species of family Eurytomidae (Hymenoptera: Chalcidoidea) known to the fauna of Bulgaria till 1996. *Plovdivski Universitet "Paisij Khilendarski" Nauchni Trudove Biologiya Animalia* 33: 23.
- Stojanova AM (2004) Eurytomidae (Hymenoptera: Chalcidoidea) of the eastern Rhodopes (Bulgaria). In Beron P, Popov A (eds). Biodiversity of eastern Rhodopes (Bulgaria and Greece). Biodiversity of Bulgaria. 2. Pensoft Series Faunistica 41. Sophia, Bulgaria: Pensoft and National Museum of Natural History, 490.
- Stratopoulou ET, Kapatos ET (1984) Preliminary results for the evaluation of the action of *Saissetia oleae* parasites in Corfu. *Entomologia Hellenica* 2: 3–9.

- Stratopoulou ET, Kapatos ET, Viggiani G (1981) Preliminary observations on the distribution and the action of *Moranila californica* (How.) (Hymenoptera: Pteromalidae) in Corfu, a possible case of competitive displacement. *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 38: 139–142.
- Suarez AV, Holway DA, Case TJ (2001) Predicting patterns of spread in biological invasions dominated by jump dispersal: insights from Argentine ants. *Proceedings of the National Academy of Sciences of the United States of America* 98: 1095–1100.
- Tadic MD (1964) Natural enemies of the fall webworm (*Hyphantria cunea* Dr.) in North America. *Entomophaga* 8: 245–252.
- Tena-Barreda A, Garcia-Mari F (2006) Natural enemies of the black scale *Saissetia oleae* (Homoptera: Coccidae) in Valencia (Spain). *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique* 29: 47–54.
- Thompson WR (1953) A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue. Part 2. Hosts of the Hymenoptera (Agaonidae to Braconidae). Ottawa, Ontario, Canada: Commonwealth Institute of Biological Control.
- Thompson WR (1955) A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue, Part 3. Hosts of the Hymenoptera (Calliceratid to Evaniid): Commonwealth Agricultural Bureaux, The Commonwealth Institute of Biological Control, Ottawa, Ontario, Canada.
- Thompson WR (1958) A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue, Part 5.: Commonwealth Agricultural Bureaux, Commonwealth Institute of Biological Control, Ottawa, Ontario, Canada.
- Tinaut A, Año JL (2000) *Paratrechina longicornis* (Latreille, 1802) nueva cita para la Península Ibérica (Hymenoptera: Formicidae). *Boletín Sociedad Entomológica Aragonesa* 24: 253–254.
- Tingle CCD, Copland MJW (1988) Predicting development of mealybug parasitoids *Anagyrus pseudococchi*, *Leptomastix dactylopii*, and *Leptomastidea abnormis* under glasshouse conditions. *Entomologia Experimentalis et Applicata* 46(1): 19–28.
- Tormos J, Beitia F, Bockmann EA, Asis JD (2009) The preimaginal stages and development of *Spalangia cameroni* Perkins (Hymenoptera: Pteromalidae) on *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae). *Micron* 40: 646–658.
- Tremblay E, Barbagallo S, Biase LMd, Monaco R, Ortu S (1978) On the presence in Italy of *Lysiphlebus testaceipes* (Cr.), a natural enemy of aphids injurious to citrus (Hymenoptera Ichneumonoidea, Homoptera Aphidoidea). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 35: 169–179.
- Trjapitzin VA (1978) Hymenoptera II. Chalcidoidea 6. Eupelmidae: Opred Nasek. Evrop. Chasti SSSR. 232 pp.
- Trjapitzin VA (1989) Parasitic Hymenoptera of the Fam. Encyrtidae of Palaearctics: Opredeliteli po Faune SSSR, 158 pp.
- Tscharntke T, Bommarco R, Clough Y, Crist TO, Kleijn D, et al. (2007) Conservation biological control and enemy diversity on a landscape scale. *Biological Control* 43: 294–309.
- Turchetto M, Villemant-Aït Lemkaden C, Vanin S (2003) Two fly parasitoids collected during an entomo-forensic investigation: the widespread *Nasonia vitripennis* (Hymenoptera Ptero-

- malidae) and the newly recorded *Tachinaephagus zealandicus* (Hymenoptera Encyrtidae). *Bollettino della Società Entomologica Italiana* 135: 109–115.
- Tussac H, Blasco-Zumeta J (1999) Especies de Chrysididae y Bethyridae (Hymenoptera: Chrysidoidea) colectadas en un sabinar de *Juniperus thurifera* L. en los Monegros (Zaragoza, España), con otras citas de interés para el mediterráneo occidental. *Lucas Mallada* 11: 197–211.
- Urbaneja A, Llacer E, Tomas O, Garrido A, Jacas JA (2000) Indigenous natural enemies associated with *Phyllocnistis citrella* (Lepidoptera: Gracillariidae) in eastern Spain. *Biological Control* 18: 199–207.
- van Achterberg C (1993) Revision of the subfamily Macrocentrinae Foerster (Hymenoptera: Braconidae) from the Palaearctic region. *Zoologische Verhandelingen, Leiden* 286: 1–110.
- van der Vecht J (1984) Die orientalische Mauerwespe *Sceliphron curvatum* (Smith) in der Steiermark, Österreich (Hymenoptera: Sphecidae). *Entomofauna* 5: 213–219.
- Van Loon AJ, Boomsma JJ, Andrásfalvy A (1990) A new polygynous *Lasius* species (Hymenoptera, Formicidae) from Central Europe. I. Description and general biology. *Insectes Sociaux* 37: 348–362.
- Vaz A, Valente C, Serrao M (2000) Biological control of *Gonipterus scutellatus* (Coleoptera: Curculionidae) in Portugal. *Abstracts, XXI International Congress of Entomology, Brazil, August 20–26, 2000* 1: 42.
- Veddeler D, Olschewski R, Tschardt T, Klein AM (2008) The contribution of non-managed social bees to coffee production: new economic insights based on farm-scale yield data. *Agroforestry Systems* 73: 109–114.
- Velimirovic V (1994) Natural enemies on *Coccus pseudomagnoliarum* Kuwana in coastal part of Montenegro. *Zastita Bilja* 45: 139–150.
- Vercher R, Garcia Mari F, Costa Comelles J, Marzal C, Granda C (2000) Importation and establishment of parasitoids of the citrus leaf miner *Phyllocnistis citrella* (Lepidoptera: Gracillariidae). *Boletín de Sanidad Vegetal Plagas* 26: 577–591.
- Vidal S (1996) Redescription and first record from Europe of the North American species *Chaenotetrastichus semiflavus* Girault, 1917 (Hymenoptera, Chalcidoidea: Eulophidae). *Entomofauna* 17: 149–152.
- Vidal S (2001) Entomofauna Germanica. Band 4. Verzeichnis der Hautflügler Deutschlands. Chalcidoidea. *Entomologische Nachrichten und Berichte Beiheft* 7: 60.
- Vidano C (1968) Riuscita acclimatazione in Italia di un parassita oofago della cicalina-bufolo Americana. Studi del gruppo di lavoro del C.N.R. per la lotta integrale contro i nemici animali delle piante: XXI. *Giornale di Agricoltura, Jesi* 78: 1–6.
- Vidano C, Marletto F (1972) Prospettive di lotta biologica contro il minatore di foglie di Robinia, *Parectopa robinella*. *Annali della Facoltà di Scienze Agrarie della Università degli Studi di Torino* 7: 417–424.
- Viggiani G (1975) La lotta biologica di tipo convenzionale. *Atti X Congresso Nazionale Italiano di Entomologia*: 178–179.
- Viggiani G (1975) Reintroduction de *Leptomastix dactylopii* How. pour la lutte biologique contre *Planococcus citri* Risso. *Fruits, Paris* 30: 259–260.

- Viggiani G (1978) *Metaphycus helvolus* (Compere), a parasite of *Saissetia oleae* (Oliv.) and other injurious scale insects, acclimatised in Italy. *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 35: 25–29.
- Viggiani G (1980) *Coccophagus matsuyamensis* Ishihara (Hym. Aphelinidae), new parasite of *Coccophagus hesperidum* L. (Hom. Coccidae) in Italy. *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 37: 45–59.
- Viggiani G (1981) New records on releases and recoveries of *Encarsia lahorensis* (How.). *Fruits, Paris* 36(3): 186–187.
- Viggiani G (1987) La specie italiane del genere *Encarsia* Foerster (Hymenoptera: Aphelinidae). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 44: 121–179.
- Viggiani G (1994) The *Aphytis* fauna of the West Palaearctic region, with notes on their role in biological control. In: Rosen D (Ed) *Advances in the Study of Aphytis*. Andover, Hampshire: Intercept Ltd., 335–347.
- Viggiani G (1994) Recent cases of interspecific competition between parasitoids of the family Aphelinidae (Hymenoptera: Chalcidoidea). *Norwegian Journal of Agricultural Sciences, Supplement* 16: 353–359.
- Viggiani G (1997) Discovery of the male of *Amitus fuscipennis* MacGown and Nebeker (Hym. Platygasteridae), a parasitoid of *Trialeurodes vaporariorum* (Westwood) (Hom. Aleyrodidae). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* No. 52: 97–99.
- Viggiani G (1998) Redescription of *Coccophagus gossypariae* Gahan (Hymenoptera, Aphelinidae), with notes on the preimaginal stages. *Phytophaga* 8: 39–47.
- Viggiani G (1999) Variations and biological traits of *Coccophagus gossypariae* Gahan (Hymenoptera : Aphelinidae). *Biological Control* 16: 43–46.
- Viggiani G, Battaglia D (1983) Osservazioni preliminari sull'*Anagyrus fusciventris* (Girault), nuovo parassita di *Pseudococcus calceolariae* (Maskell) in Italia. *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 40: 109–114.
- Viggiani G, Bernardo U (1996) Lotta biologica al tripide delle serre (*Heliothrips haemorrhoidalis*). *Informatore Agrario* 52: 73–75.
- Viggiani G, Garonna AP (1993) Le specie italiane del complesso *Archenomus* Howard, *Archenomiscus* Nikolskaja, *Hispaniella* Mercet e *Pteroptrix* Westwood, con nuove combinazioni generiche (in Italian) (Hymenoptera: Aphelinidae). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 48: 57–88.
- Viggiani G, Gerling D (1994) Chapter 9. Host-range increase of indigenous and introduced parasitoids. In: Narang SK, Bartlett AC, Faust RM (Ed) *Application of Genetics to Arthropods of Biological Control Significance*, 150.
- Viggiani G, Gerling D (1994) Chapter 9. Host-range increase of indigenous and introduced parasitoids. In: Narang SK, Bartlett AC, Faust RM (Eds) *Application of Genetics to Arthropods of Biological Control Significance*. Boca Raton (USA): CRC Press, 147–157.
- Viggiani G, Guerrieri E (1988) Le specie italiane del genere *Metaphycus* Mercet (Hymenoptera: Encyrtidae). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 45: 113–140.
- Viggiani G, Iannaconne F (1972) Osservazioni sulla biologia e sui parassiti dei diaspini *Chrysomphalus dictyospermi* (Morg.) e *Lepidosaphes beckii* (Newm.) svolte in Campania nel triennio. *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 30: 104–116.

- Viggiani G, Laudonia S (1989) La specie italiane di *Trichogramma* Westwood (Hymenoptera: Trichogrammatidae), con un commento sullo stato della tassonomia del genere). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 46: 107–124.
- Viggiani G, Mazzone P (1977) Introdotta in Italia la *Prospaltella lahorensis* How. per il controllo biologico di *Dialeurodes citri* (Ashm.). *Informatore Fitopatologico* 27(10): 5–7.
- Viggiani G, Mazzone P (1977) Notizie preliminari sulla introduzione in Italia di *Metaphycus* aff. *stanleyi* Comp. e *Diversinerus elegans* Silv. (Hym. Encyrtidae), parassiti di *Saissetia oleae* (Oliv.). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 34: 217–222.
- Viggiani G, Mazzone P (1978) Morfologia, biologia e utilizzazione di *Prospaltella lahorensis* How. (Hym. Aphelinidae), parassita esotico introdotto in Italia per la lotta biologica al *Dialeurodes citri* (Ashm.). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 35: 99–161.
- Viggiani G, Mazzone P (1979) Contributi alla conoscenza morfo-biologica delle specie del complesso *Encarsia* Foerster - *Prospaltella* Ashmead (Hym. Aphelinidae). 1. Un commento sull'attuale stato, con proposte sinonimiche e descrizione di *Encarsia silvestrii* n.sp., parassita di *Bemisia citricola* Gom.Men. (Hom. Aleyrodidae). *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 36: 42–50.
- Viggiani G, Nieves Aldrey JL (1993) Prima segnalazione di *Goetheana shakespearei* Girault (Hymenoptera Eulophidae), parassitoide esotico di Thysanoptera, per l'Europa. *Bollettino di Zoologia Agraria e Bachicoltura, Milano* 25: 105–108.
- Viggiani G, Romagnoli R (1995) European elm scale. *Informatore Agrario* 51: 82–84.
- Viitasaari M (2002) The Northern European taxa of Pamphilidae (Hymenoptera). In: Viitasaari M (Ed) Sawfly (Hymenoptera, Symphyta). I. A review of the suborder, the Western Palearctic taxa of Xyeloidea and Pamphilioidea. Helsinki: Tremex Press Ltd., 235–358.
- Viitasaari M, Midtgaard F (1989) A Contribution to the taxonomy of horntails with notes on the genus *Sirex* Linnaeus (Hymenoptera, Siricidae). *Annales Entomologici Fennici* 55: 103–110.
- Villemant C, Haxaire J, Streito JC (2006) Premier bilan de l'invasion de *Vespa velutina* Lepelletier en France (Hymenoptera, Vespidae). *Bulletin de la Société entomologique de France* 111: 535–538.
- Vipin S, Santoni A, Pinniger DB (1999) Infestations of insect and rodent pests in multi-occupancy dwellings in a London borough - a study to investigate factors affecting control. *Proceedings of the 3rd International Conference on Urban Pests. Czech University of Agriculture, Prague, Czech Republic, 19–22 July 1999.*: 507–514.
- Vis RMJd, Lenteren JCv (2008) *Amitus fuscipennis*, an alternative to the biological control of *Trialeurodes vaporariorum* by *Encarsia formosa*? *Bulletin of Insectology* 61: 313–325.
- Vitousek P, D'Antonio CM, Loope LL, Rejmanek M, Westbrooks R (1997) Introduced species: a significant component of human caused global change. *New Zealand Journal of Ecology* 21: 1–16.
- Voegelé J, Pizzol J, Babi A (1988) The overwintering of some *Trichogramma* species. *Colloques de l'INRA* 43: 275–282.

- von Aderkas P, Rouault G, Wagner R, Rohr R, Roques A (2005) Seed parasitism redirects ovule development in Douglas fir. *Proceedings of the Royal Society of London Series B-Biological Sciences* 272: 1491–1496.
- Walker F (1871) Notes on Chalcididae. Part 1, Eurytomidae. *E. W. Janson, London*: 1–18.
- Walton VM, Pringle KK (2002) Evaluating effectiveness of mass release of the vine mealybug (*Planococcus ficus*) parasitoid *Coccidoxenoides peregrinus* in western Cape Province vineyards, South Africa. *Proceedings of the 1st International Symposium on Biological Control of Arthropods, Honolulu, Hawaii* 14–18 January 2002.
- Way MJ, Cammell ME, Paiva MR, Colligwood CA (1997) Distribution and dynamics of the argentine ant *Linepithema (Irydomirmex) humile* (Mayr) in relation to vegetation, soil conditions, topography and native competitor ants in Portugal. *Insectes Sociaux* 44: 415–433.
- Wetterer JK (2009) Worldwide spread of the destroyer ant, *Monomorium destructor* (Hymenoptera: Formicidae). *Myrmecological News* 12: 97–108.
- Wetterer JK (2009) Worldwide spread of the ghost ant, *Tapinoma melanocephalum* (Hymenoptera: Formicidae). *Myrmecological News* 12: 23–33.
- Wetterer JK, Espadaler X, Wetterer AL, Aguin-Pombo D, Franquinho-Aguiar AM (2006) Long-term impact of exotic ants on the native ants of Madeira. *Ecological Entomology* 31: 358–368.
- Wetterer JK, Espadaler X, Wetterer AL, Aguin-Pombo D, Franquinho-Aguiar AM (2007) Ants (Hymenoptera : Formicidae) of the Madeiran archipelago. *Sociobiology* 49: 265–297.
- Wetterer JK, Espadaler X, Wetterer AL, Cabral SGM (2004) Native and exotic ants of the Azores (Hymenoptera: Formicidae). *Sociobiology* 44: 1–20.
- Wetzel C, Dickler E (1994) Side effects of sulphur and a natural pyrethroid on *Trichogramma dendrolimi* Matsumura (Hym., Trichogrammatidae) in apple orchards. *Bulletin. Section Regionale Ouest Palaearctique, Organisation Internationale de Lutte Biologique*. 17: 123–131.
- Wiebes JT (1980) The genus *Odontofroggattia* Ishii (Hymenoptera Chalcidoidea, Pteromalidae Epichrysomallinae). *Zoologische Verhandelingen, Leiden* 56: 1–6.
- Wild AL (2004) Taxonomy and distribution of the Argentine ant, *Linepithema humile* (Hymenoptera : Formicidae). *Annals of the Entomological Society of America* 97: 1204–1215.
- Wild AL (2007) Taxonomic revision of the ant genus *Linepithema* (Hymenoptera: Formicidae). *University of California Publications in Entomology* 126: 1–151.
- Wild AL (2009) Evolution of the Neotropical ant genus *Linepithema*. *Systematic Entomology* 34: 49–62.
- Winter TG (1988) *Tremex columba* L. (Hym., Siricidae) imported into Britain in elm logs. *Entomologist's Monthly Magazine* 124: 36.
- Wisniowski B (1987) *Mesopolobus pinus* (Hussey, 1960 (Hym., Pteromalidae) a new parasite of *Megastigmus suspectus* Borries, 1895 (Hym., Torymidae) in Fir-seeds. *Anzeiger für Schädlingkunde Pflanzenschutz Umweltschutz* 60: 67–68.
- Witmond L (2001) An addition and correction to the list of *Urocerus* species occurring in The Netherlands (Hymenoptera: Siricidae). *Entomologische Berichten* 61: 30–32.
- Woets J, Linden Avd (1985) First experiments on *Chrysocharis parksi* (Hym. Eulophidae) as a parasite for leafminer control (*Liriomyza* spp., Diptera: Agromyzidae) in European green-

- house tomatoes. *Mededelingen van de Faculteit Landbouwwetenschappen, Rijksuniversiteit Gent* 50: 763–768.
- Wood BJ (1962) Natural enemies in the control of citrus pests in Cyprus. Part 2. The insectary built at Fassouri, and a preliminary report on newly imported natural enemies. *Countryman* 1962: 16–22.
- Woolley JB (1988) Phylogeny and classification of the Signiphoridae (Hymenoptera: Chalcidoidea). *Systematic Entomology* 13: 465–501.
- Wysocki M, Rene S, Eliahu M, Blumberg D (2000) Influence of spinosad on some hymenopterous natural enemies of avocado, citrus and other orchard pests. *Abstracts, XXI International Congress of Entomology, Brazil, August 20–26, 2000* 1: 357–363.
- Yarrow IH (1967) On the Formicidae of the Azores. Report No. 51 from the Lund University Expedition in 1957 to the Azores and Madeira. *Boletim do Museu Municipal do Funchal* 21: 24–32.
- Yasnosh VA (1978) Hymenoptera II. Chalcidoidea 15. Aphelinidae. *Opredeliteli po faune S.S.S.R.* 1–494.
- Yefremova ZA (2002) Catalogue of the Eulophidae (Hymenoptera: Chalcidoidea) of Russia. *Linzer Biologische Beiträge* 34: 563–618.
- Yemshanov D, Koch FH, McKenney DW, Downing MC, Sapio F (2009) Mapping invasive species risks with stochastic models: A cross-border United States-Canada application for *Sirex noctilio* Fabricius. *Risk Analysis* 29: 868–884.
- Zerova MD (1970) A new species of the genus *Bruchophagus* Ashm. (Hymenoptera, Eurytomidae) from the south part of the USSR. *Vestnik Zoologii, Kiev* 1970: 77–79.
- Zerova MD (1978) Hymenoptera II. Chalcidoidea 8. Eurytomidae Opred. Nasek. Evrop. Chasti SSSR pp.
- Zinna G (1960) Esperimenti di lotta biologica contro. II. Cotonello degli agrumi (*Pseudococcus citri* (Risso)) del isola di Procida mediante l'impiego di du parassiti esotica, *Pauridia peregrina* Timb. e *Leptomastix dactylopii* How. *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 18: 257–284
- Zinna G (1961) Specializzazione entomoparassiti negli Aphelinidae: studio morfologico, etologico e fisiologico del *Coccophagus bivittatus* Compere, nuovo parassita del *Coccus hesperidum* L. per l'Italia. *Bollettino del Laboratorio di Entomologia Agraria Filippo Silvestri* 19: 302–358.

Table 12.1. Hymenoptera species alien to Europe. List and characteristics. Status: A: Alien to Europe; C: cryptogenic species. Country codes abbreviations refer to ISO 3166 (see appendix I). Habitat abbreviations refer to EUNIS (see appendix II). Last update 01/03/2010

Families <i>Species</i>	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
Agoninidae								
<i>Platyscapa quadraticeps</i> (Mayr, 1885)	A	phyto- phagous	Asia	1968, IL	IL, IT	I2, G	<i>Ficus</i>	Koponen and Askew (2002), Lo Verde et al. (1991)
<i>Eupristina verticillata</i> Waterston, 1921	A	phyto- phagous	Asia	1991, ES- CAN	ES-CAN, IT, IT-SIC	I2, G	<i>Ficus</i>	Beardsley and Rasplus (2001), Lo Verde (2002)
<i>Josephiella microcarpae</i> Beardsley & Rasplus, 2001	A	phyto- phagous	Asia	1997, ES- CAN	ES-CAN, IT, IT-SIC	I2, G	Gall maker on <i>Ficus</i> leaves	Compton (1989), Lo Verde et al. (1991), Wiebes (1980)
<i>Odontofroggattia galili</i> Wiebes, 1980	A	phyto- phagous	Asia	1979, GR- SEG	GR-SEG, IL, IT, IT-SIC	I2, G	<i>Ficus</i>	Galil and Eisikowitch (1968)
Aphelinidae								
<i>Ablerus chionaspidis</i> (Howard, 1914)	A	parasitic/ predator	Asia	1972, IT	ES, IL, IT, RS,	G4	Diaspidid scale insects (Hyperparasitoid and parasitoid)	Herting (1972), Herting (1977), Ofek et al. (1997)
<i>Ablerus clisiocampae</i> (Ashmead, 1894)	A	parasitic/ predator	Asia	1953, FR	FR, IT	G4	Diaspidid scale insects and lepidopteran eggs (Hyperparasitoid and parasitoid both of)	Peck (1963), Yasnosh (1978)
<i>Ablerus perspectosus</i> Girault, 1916	A	parasitic/ predator	Asia	1972, FR	FR, IL, IT, RS, YU	G3, G4	White peach scale, <i>Pseudaulacaspis</i> <i>pentagona</i> (parasite)	Battaglia et al. (1994), Herting (1972), Kozarazhevskaya and Mihajlovic (1983), Mendel et al. (1984)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Apbelinus mali</i> (Haldeman, 1851)	A	parasitic/ predator	North America	1921, IT	AL, AT, BG, CH, CZ, DE, DK, FR, HU, IL, IT, MD, NL, PT, RO, RU, SI, SK, UA,	I2	Woolly apple aphid, <i>Eriosoma lanigerum</i> (Monophagous parasitoid)	Del Guercio (1925)
<i>Apbelinus semiflavus</i> Howard, 1908	A	parasitic/ predator	North America	1953, ES	DE, ES, IL, IT	I,	Aphids (<i>Acyrtosiphon</i> <i>pisum</i> , <i>Macrosiphum</i> , etc.)	Herting (1972), Janssen (1961), Thompson (1953)
<i>Aphytis abnormis</i> (Howard, 1881)	A	parasitic/ predator	North America	1953, FR	ES, FR-COR, GR, HU	G4	Diaspidids and coccids scale insects (<i>Lepidosaphes</i> , <i>Coccus</i>)	Herting (1972), Peck (1963), Stathas and Kontodimas (2001), Thompson (1953)
<i>Aphytis acrenulatus</i> DeBach & Rosen, 1976	A	parasitic/ predator	Africa	1994, IT	IT	I	Diaspidid scale insects (<i>Aspidiella zingiberi</i> and <i>Rhizaspidiotus</i> <i>donacis</i>))	Garonna (1994)
<i>Aphytis chilensis</i> Howard, 1900	A	parasitic/ predator	South America	1910, ES	CY, DE, ES, FR, GR, IT-SIC	I, G3, J100	Diaspidid scale insects (<i>Aspidiotus</i> , <i>Hemiberlesia</i> etc.)	Alexandrakis and Neuenschwander (1979), Herting (1972), Liotta (1974), Mercet (1911), Thompson (1953), Viggiani (1994a)
<i>Aphytis coheni</i> DeBach, 1960	A	parasitic/ predator	Asia	1959, IL	CY, GR, IL	I	<i>Chrysomphalus</i> <i>dictyospermi</i> on <i>Citrus</i>	DeBach (1960), Rosen and DeBach (1979), Wood (1962)
<i>Aphytis diaspidis</i> (Howard, 1881)	A	parasitic/ predator	North America	1952, F	AT, CY, ES, FR, GR, IL, IT, NL, PL	I, G3	Diaspidid scale insects	Applebaum and Rosen (1964), Herting (1972), Rosen and DeBach (1979), Thompson (1953)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Aphytis holoxanthus</i> DeBach, 1960	A	parasitic/ predator	Asia	1959, IL	BE, CY, CZ, DE, ES, FR, IL, NL	I, J100	Diaspidid scale insects (<i>Chrysomphalus ficus</i>), <i>Citrus</i> , <i>Ficus</i> , <i>Musa</i> , <i>Cucurbita</i>	DeBach (1960), Wood (1962)
<i>Aphytis lepidosaphes</i> Compere, 1955	A	parasitic/ predator	Asia	1961, CY	CY, ES, FR, FR- COR, GR, GR- CRE, IL, IT	I	<i>Lepidosaphes beckeri</i> on <i>Citrus</i>	Argyriou (1974), Benassy et al. (1974), Rosen (1965), Rosen and DeBach (1979), Viggiani and Iannaconne (1972), Wood (1962)
<i>Aphytis lingnanensis</i> Compere, 1955	A	parasitic/ predator	Asia	1966, IT	AL, CY, ES, GR, IL, IT	I	<i>Aonidiella aurantii</i> and other scales on <i>Citrus</i>	Argov et al. (1995), Rosen and DeBach (1979), Viggiani (1994a)
<i>Aphytis melinus</i> DeBach, 1959	A	parasitic/ predator	Asia	1966, IT- SIC	AL, BE, CY, CZ, DE, DK, ES, FR, GR, IL, IT-SIC, IT, PT	I, J100	<i>Aonidiella aurantii</i> on <i>Citrus</i>	Alexandrakis and Benassy (1981), Insera (1971), Rosen and DeBach (1979), Viggiani (1994a)
<i>Aphytis mytilaspidis</i> (Le Baron, 1870)	A	parasitic/ predator	North America	1837, FR	BE, BG, CH, CY, CZ, DE, ES, FR, GB, GR, HR, HU, IT, ME, NL, PL, RO, RS, SE, SI, SK, UA,	I, G3, J100	Diaspidid scale insects	Rosen and DeBach (1979), Viggiani (1994a)
<i>Aphytis yanonensis</i> DeBach & Rosen, 1982	A	parasitic/ predator	Asia	1986, FR	FR, GR	I, J100	Scale parasitoid on citrus	Benassy and Pinet (1987)
<i>Cales noacki</i> Howard, 1907	A	parasitic/ predator	C & S America	1970, IT	ES, ES-CAN, FR, GR, IL, IT, IT-SAR, IT-SIC, MT, PT	I, J100	<i>Aleurothrixus floccosus</i> on <i>Citrus</i>	Carrero (1979), Del Bene and Gargani (1991), Onillon (1973), Spicciarelli et al. (1996)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Centrodora speciosissima</i> (Girault, 1911)	A	parasitic/ predator	North America	1943, HU	AT, DE, HU, RU, UA	I	Pupae of dipterous, chalcid and proctotrupids (hyperparasitoid)	Erdős (1953), Herting (1978), Peck (1963), Thompson (1953)
<i>Coccobius fulvus</i> (Compere & Annecke, 1961)	A	parasitic/ predator	North America	1986, FR	FR	I2, J100	Diaspidid scales on ornamental plants and <i>Citrus</i>	Benassy and Pinet (1987)
<i>Coccophagoides</i> <i>murtfeldtae</i> (Howard, 1894)	A	parasitic/ predator	North America	1962, IT	IT	I	<i>Pseudaulacaspis</i> <i>pentagona</i>	Peck (1963)
<i>Coccophagoides utilis</i> Doutt, 1966	A	parasitic/ predator	North America	1975, GR	GR	I	<i>Parlatoria oleae</i> on olive tree	Argyriou and Kourmadas (1979)
<i>Coccophagus bivittatus</i> Compere, 1931	A	parasitic/ predator	Africa	1960, IT	IL, IT	I	<i>Coccus hesperidum</i>	Herting (1972), Zinna (1961)
<i>Coccophagus capensis</i> Compere, 1931	A	parasitic/ predator	Africa	1962, IT- SIC	IL, IT-SIC	I	<i>Saissetia oleae</i>	Argov and Rössler (1988), Peck (1963)
<i>Coccophagus ceroplastae</i> (Howard, 1895)	A	parasitic/ predator	Asia	1975, FR	FR, IL	I, J100	<i>Saissetia oleae</i> and <i>Ceroplastes floridensis</i> on <i>Citrus</i>	Argov and Rössler (1988), CIBC (1976)
<i>Coccophagus cowperi</i> Girault, 1917	A	parasitic/ predator	Africa	1963, IT	GR, IL, IT	I	<i>Saissetia oleae</i> and other coccids, (sometimes hyperparasitoid)	Ben-Dov (1978)
<i>Coccophagus</i> <i>flavoscutellum</i> Ashmead, 1881	A	parasitic/ predator	North America	1962, IT- SIC	IT-SIC	I	<i>Coccus oleae</i>	Monastero (1962)
<i>Coccophagus gossypariae</i> Gahan, 1927	A	parasitic/ predator	North America	1990, IT	DE, IT	I	<i>Gossyparia spuria</i> (Eriococcidae)	Viggiani (1998), Viggiani (1999), Viggiani and Romagnoli (1995)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Coccophagus gurneyi</i> Compere, 1929	A	parasitic/ predator	Asia	1973, IT	IT	I	<i>Pseudococcus fragilis</i>	Viggiani (1975a)
<i>Coccophagus matsuyamensis</i> Ishihara, 1977	A	parasitic/ predator	Asia	1979, IT	IT,	I	<i>Coccus hesperidum</i>	Viggiani (1980)
<i>Coccophagus saissetiae</i> (Annecke & Mynhardt, 1979)	A	parasitic/ predator	Africa	1978, IL	IL, IT	I	<i>Saissetia oleae</i> on <i>Citrus</i>	Annecke and Mynhardt (1979b), Mazzone and Viggiani (1983)
<i>Coccophagus scutellaris</i> (Dalman, 1825)	C	parasitic/ predator	Crypto- genic	1826, SE	AL, BE, DE, ES, FR, IL, NL, PT, SE	I, J100	scales on <i>Citrus</i> , Vine, <i>Populus</i> and others (polyphagous)	Carrero (1980), Faber and Sengonca (1997), Montiel and Santaella (1995), Oncuer (1974), Panis et al. (1977), Paraskakis et al. (1980)
<i>Coccophagus silvestrii</i> Compere, 1931	A	parasitic/ predator	Asia- Temperate	1972, FR	CZ, FR,	I, J100	Various coccids on <i>Citrus</i>	Viggiani and Mazzone (1979)
<i>Coccophagus varius</i> (Silvestri, 1915)	A	parasitic/ predator	Africa	1983, IT	IL, IT	I	<i>Saissetia oleae</i>	Mazzone and Viggiani (1983)
<i>Encarsia acaudaleyrodidis</i> Hayat, 1976	A	parasitic/ predator	Asia	1999, ES- CAN	ES-CAN	J100	Aleyrodidae	Hernández-Suárez et al. (2003)
<i>Encarsia aurantii</i> (Howard, 1894)	A	parasitic/ predator	North America	1941, IT	CH, DE, FR, HU, IT, PL	I, G3	Diaspidid scale insects (polyphagous)	Howard (1895)
<i>Encarsia azimi</i> Hayat, 1986	A	parasitic/ predator	Asia	2001, IT	ES, ES-CAN, IT,	I, J100	Aleyrodidae on various cultivated plants	Gonzalez Zamora et al. (1996), Kirk et al. (1993)
<i>Encarsia berlesei</i> (Howard, 1906)	A	parasitic/ predator	Asia	1906, IT	AL, AT, BG, CH, DE, ES, FR, GR, HR, HU, IT, IT- SAR, IT-SIC, ME, RU, SI, YU	I	<i>Pseudaulacaspis pentagona</i>	Ferrière (1961), Howard (1912), Silvestri (1908)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Encarsia citrina</i> (Craw, 1891)	C	parasitic/ predator	Crypto- genic	1915, NL	BE, DE, ES, FR, NL	J100	Scales on olive, <i>Citrus</i> , etc (polyphagous)	Ghesquière (1933), Smits van Burgst (1915)
<i>Encarsia diaspidicola</i> (Silvestri, 1909)	A	parasitic/ predator	Asia	1962, IT	IT	I	<i>Pseudaulacaspis</i> <i>pentagona</i>	Peck (1963)
<i>Encarsia fasciata</i> (Malenotti, 1917)	C	parasitic/ predator	Crypto- genic	1917, IT	CH, DE, ES, FR, IL, IT	I	Scales on <i>Laurus</i> , <i>Citrus</i> , <i>Populus</i> , <i>Crataegus</i> , <i>Malus</i>	Gerson (1967), Herting (1972), Malenotti (1917), Neuffer (1962), Thompson (1953)
<i>Encarsia formosa</i> (Gahan, 1924)	A	parasitic/ predator	C & S America	1964, BU	AL, AT, BE, BG, CH, CZ, DE, DK, EE, ES-CAN, FI, FR, GB, HU, IE, IL, IT, IT-SAR, IT-SIC, IT, LT, MT, NL, NO, PL, PT, RO, RS, SE, SK	I, J100	Whiteflies	Burnett (1962), Gerling (1966), Kowalska (1969), Lenteren et al. (1976), Scopes (1969), Stenseth (1976), Viggiani (1987)
<i>Encarsia guadeloupae</i> Viggiani, 1987	A	parasitic/ predator	C & S America	2000, ES- CAN	ES-CAN	I	<i>Aleurodicus dispersus</i> and <i>Lecanoides</i> <i>flocissimus</i>	Nijhor, 2000 #587}
<i>Encarsia herndoni</i> (Girault, 1935)	A	parasitic/ predator	Asia	1987, FR	AL, ES, FR-COR, IT, IT-SIC	I, J100	<i>Insulaspis gloverii</i> , scale on <i>Citrus</i>	Benassy and Brun (1989), Liotta et al. (2003), Maniglia et al. (1995), Viggiani (1987)
<i>Encarsia hispida</i> De Santis, 1948	A	parasitic/ predator	South America	1992, IT	ES-BAL, ES-CAN , FR, IT,	I, J100	<i>Bemisia</i>	Nijhof et al. (2000)
<i>Encarsia inquirenda</i> (Silvestri, 1930)	A	parasitic/ predator	Asia - Temperate	1979, ES	ES, IL, IT	I2	<i>Lepidosaphes gloverii</i> on <i>Citrus</i> , against	Viggiani (1987)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Encarsia lahorensis</i> (Howard, 1911)	A	parasitic/ predator	Asia	1973, IT	FR, GR, IL, IT, IT- SAR, IT-SIC, RU,	I, J100	Citrus whitefly, <i>Dialeurodes citri</i> (specific parasitoid)	Pappas and Viggiani (1979), Viggiani (1981), Viggiani and Mazzone (1977a), Viggiani and Mazzone (1978)
<i>Encarsia lounsburyi</i> (Berlese & Paoli, 1916)	A	parasitic/ predator	Africa	1922, IT	AL, CH, CY, ES, ES-BAL, FR, FR- COR, FR, GR, IL, IT, NL, PT	I, J100	<i>Insulaspis gloverii</i> scale on <i>Citrus</i>	Viggiani (1987)
<i>Encarsia meritoria</i> Gahan, 1927	A	parasitic/ predator	North America	1990, IT	IT, IT-SIC	I	<i>Bemisia tabaci</i> on <i>Gossypium</i>	Viggiani (1987)
<i>Encarsia pergandiella</i> Howard, 1907	A	parasitic/ predator	Asia?	1978, IT	FR, IL, IT, IT-SIC	I	<i>Bemisia</i>	Buijs et al. (1981), Rivnay and Gerling (1987), Viggiani (1987)
<i>Encarsia perniciosi</i> (Tower, 1913)	A	parasitic/ predator	Asia	1946, IT	AL, AT, BG, CH, CZ, DE, DK, YU, FR, GR, GL, IT, IT-SIC, RO, RS, SK, YU	I	San Jose scale	Bénassy et al. (1965), Bénassy et al. (1968), Gambaro (1965), Mathys and Guignard (1962), Neuffer (1962), Neuffer (1968)
<i>Encarsia porteri</i> (Mercet, 1928)	A	parasitic/ predator	South America	1993, IT	IT	I	Aleyrodidae and various insect eggs	Viggiani and Gerling (1994b)
<i>Encarsia protransvena</i> Viggiani, 1985	A	parasitic/ predator	North America	1998, ES	ES, IT	I	Aleyrodidae and scale insects	Giorgini (2001), Polaszek et al. (1999)
<i>Encarsia sophia</i> (Girault & Dodd, 1915)	A	parasitic/ predator	Asia	1992, IT	ES, ES-CAN, IL, IT,	I	<i>Bemisia</i> and whiteflies	Gonzalez Zamora et al. (1996), Hernández-Suárez et al. (2003), Pedata and Viggiani (1993), Viggiani and Gerling (1994a)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Eretmocerus californicus</i> Howard, 1895	A	parasitic/ predator	North America	1987, IL	DE, ES, IL, IT, MT, PL	I	<i>Bemisia</i>	Abd-Rabou (1999), Albert and Schneller (1994), Argov and Rössler (1988), Baraja et al. (1996), Bednarek and Goszczynski (2002), Mifsud (1997)
<i>Eretmocerus corni</i> Haldeman, 1850	A	parasitic/ predator	North America	1963, IT	GR, IT	I	<i>Siphoninus phillyreae</i> (Aleyrodidae)	Menteelos (1967)
<i>Eretmocerus debachi</i> Rose & Rosen, 1992	A	parasitic/ predator	North America	1991, IT	IL, IT, IT-SIC,	I	<i>Parabemisia myricae</i> on citrus	Rose and Rosen (1992)
<i>Eretmocerus eremicus</i> Rose & Zolnerowich, 1997	A	parasitic/ predator	North America	1994, CZ	BE, CH, CZ, DK, ES, FI, FR, DE, GR, HU, IT, LT, MT, NL, NO, PL, PT, SK	I, J100	<i>Bemisia</i> , <i>Trialeurodes</i>	Berndt et al. (2007), Gerling et al. (2001), Gonzalez et al. (2008), Lacordaire and Dussart (2008), Mary (2005), Rose and Zolnerowich (1997), Stansly et al. (2005)
<i>Eretmocerus haldemani</i> Howard, 1908	A	parasitic/ predator	Asia	1968, FR- COR	FR-COR, UA	I	Aleyrodids (<i>Bemisia</i> , <i>Trialeurodes</i>) on <i>Citrus</i> , <i>Solanum</i> , ..	Chumak (2003), Onillon (1969)
<i>Eretmocerus paulistus</i> Hempel, 1904	A	parasitic/ predator	North America	1970, ES	AL, ES	I	<i>Aleurothrixus floccosus</i> in <i>Citrus</i> groves	DeBach and Rose (1976a), DeBach and Rose (1976b)
<i>Marietta carnesi</i> (Howard, 1910)	A	parasitic/ predator	Asia	1987, ES	IT, ES	I	Hyperparasitoid	Rosen (1962)
<i>Pteroptrix chinensis</i> (Howard, 1907)	A	parasitic/ predator	Asia	1974, IT	IT, RU	I	<i>Mytilococcus beckii</i> on <i>Citrus</i>	Liao et al. (1987), Viggiani (1975a)
<i>Pteroptrix orientalis</i> (Silvestri, 1909)	A	parasitic/ predator	Asia	1909, IT	IT	I	<i>Chrysomphalus</i> <i>dictyospermi</i>	Viggiani and Garonna (1993)
<i>Pteroptrix smithi</i> (Compere 1953)	A	parasitic/ predator	Asia	1968, IL	IL, IT	I	<i>Chrysomphalus</i> <i>aonidium</i>	Flanders (1969), Viggiani (1975a)

Families <i>Species</i>	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
Bethylidae								
<i>Cephalonomia waterstoni</i> Gahan, 1931	C	parasitic/ predator	Crypto- genic	Unknown, GB	GB	J	Grain beetles (<i>Cryptolestes</i>)	Finlayson (1950)
<i>Holepyris sylvanidis</i> (Brèthes, 1913)	C	parasitic/ predator	Crypto- genic	Unknown, GB	GB	J	<i>Tribolium confusum</i> (Larval parasitoid)	Fitton et al. (1978)
<i>Laelius utilis</i> Cockerell, 1920	A	parasitic/ predator	North America	Unknown, SE	SE	J	<i>Anthrenus</i>	Gordh and Moczar (1990)
<i>Plastanoxus laevis</i> (Ashmead, 1893)	A	parasitic/ predator	North America	Unknown	ES, FR, IL, IT	J	Various grain beetles (Cucujidae)	Tussac and Blasco-Zumeta (1999)
Braconidae								
<i>Aphidius colemani</i> Viereck, 1912	A	parasitic/ predator	Asia- Temperate	1965, CZ	AL, AT, BE, CH, CZ, DE, DK, ES, FI, , FR, FR-COR, GB, GR, HU, IE, IT, LT, MT, NL, NO, PL, PT, PT- MAD, SE, SK,	E, I1, I2, J100	Aphids in greenhouses	Clausen (1978), Stary (1975), Stary and Remaudiere (1973), Stary et al. (1977){
<i>Aphidius smithi</i> Sharma & Subba Rao, 1959	A	parasitic/ predator	Asia- Temperate	1960, PL	AL, BG, CH, CY, CZ, DE, DK, ES, ES-CAN, FI, GR, HR, HU, IE, IL, IT, IT-SIC, LT, MD, NL, PL, PT, PT- MAD, RU, SK, UA	I	<i>Acyrtosiphon kondoi</i> and <i>A. pisum</i>	Pennacchio (1989)
<i>Cotesia hyphantriae</i> (Riley, 1887)	A	parasitic/ predator	North America	1953, YU	YU	G4	<i>Hyphantria cunea</i>	Glavendekic (2000)
<i>Cotesia marginiventris</i> (Cresson, 1865)	A	parasitic/ predator	North America	1993, FR	BE, DE, ES, FR, NL	J100	grasslands (N)- greenhouses (I)	Clausen (1978)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Diachasmimorpha fullawayi</i> (Silvestri, 1912)	A	parasitic/ predator	Africa	Unknown, IT	IT	I	fruit-Infesting Tephritidae	Clausen (1978)
<i>Diachasmimorpha tryoni</i> (Cameron, 1911)	A	parasitic/ predator	Australasia	1932, ES	ES, ES-CAN, IL	I	fruit-Infesting Tephritidae	Clausen (1978)
<i>Heterospilus cephi</i> Rohwer, 1925	A	parasitic/ predator	North America	Unknown, GB	GB	I	<i>Cephus pygmeus</i>	Clausen (1978)
<i>Hymenochaonia delicata</i> (Cresson 1872)	A	parasitic/ predator	North America	1933, FR	FR, IT	I	<i>Cydia molesta</i>	van Achterberg (1993)
<i>Lysiphlebus testaceipes</i> (Cresson, 1880)	C	parasitic/ predator	Crypto- genic	1965, CZ	AL, BG, CZ, DK, ES, FR FR-COR, IT, IT-SIC, PT	E, I	Aphids	Barbagallo et al. (1983), Costa and Sary (1988), Kavallieratos and Lykouressis (1999), Ortu and Prota (1983), Sary et al. (1985), Steenis (1992), Tremblay et al. (1978)
<i>Macrocentrus ancylivorus</i> (Rohwer, 1923)	A	parasitic/ predator	North America	1930, IT- SAR	FR-COR, IT-SAR,	i	<i>Ancylis comptana</i>	Labeyrie (1957)
<i>Microgaster pantographae</i> Muesebeck, 1922	A	parasitic/ predator	North America	Unknown, GB	GB	I	Tortricid moths	Fitton et al. (1978)
<i>Opius dimidiatus</i> Ashmead, 1889	A	parasitic/ predator	North America	Unknown, NL	NL	I1	<i>Liriomyza trifolii</i> (Solitary endoparasitoid)	van der Linden (1986)
<i>Pauesia cedrobii</i> Stary & Leclant 1977	A	parasitic/ predator	Africa	1987, FR	FR, IL	G1, I2	<i>Cedrodium</i> on <i>Cedrus</i>	Fabre and Rabasse (1987), Remaudière and Sary (1993)

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<i>Pauesia unilachni</i> (Gahan, 1927)	A	parasitic/ predator	Asia	1930, ES	ES, IT	G3	Grey pine aphid, <i>Schizolachnus pineti</i>	Quilis Pérez (1931)
<i>Perilitus vittatae</i> (Muesebeck, 1936)	A	parasitic/ predator	North America	Unknown, DE	DE	I	<i>Phyllotreta</i> leaf beetles (adults)	Haeselbarth (2008)
<i>Pyttalia concolor</i> (Szépligeti, 1910)	A	parasitic/ predator	Africa	1914, IT	FR, GL, IT	G4	Fruit-Infesting Tephritidae	Clausen (1978), Delanoue (1960)
Ceraphronidae								
<i>Aphanogmus bicolor</i> Ashmead, 1893	A	parasitic/ predator	North America	Unknown	AT, BE, CH, DK, FI, GR, HR, RS	I	Cecidomyidae	Dessart (1994)
Chalcididae								
<i>Dirhinus giffardii</i> Silvestri, 1913	A	parasitic/ predator	Africa	1912, IT	GR, IL, IT	I	Fruits	Greathead (1976), Podoler and Mazor (1981), Thompson (1953)
Cynipidae								
<i>Dryocosmus kuripbilus</i> Yasumatsu, 1951	A	phyto- phagous	Asia- Temperate	2002, IT	CH, FR, HU, IT, SI	G1, I2	<i>Castanea</i>	Anonymous (2005), Breisch and Streito (2004), Csoka et al. (2009), Forster et al. (2009), Graziosi and Santi (2008)
Dryinidae								
<i>Neodryinus typhlocybae</i> (Ashmead, 1893)	A	parasitic/ predator	North America	1994, IT	CH, FR, IT, SI	I	<i>Metcalfa pruinosa</i>	Malausa (1999), Malausa et al. (2003)
Encyrtidae								
<i>Adelencyrtus aulacaspidis</i> (Brèthes, 1914)	A	parasitic/ predator	South America	1930, FR	BG, CH, CZ, DE, ES, FR, GB, HR, HU, IT, RU, SI, UA	G3, G4	Various Diaspididae	Triapitzin (1989)
<i>Aenasius flandersi</i> Kerrich, 1967	A	parasitic/ predator	South America	1999, ES- CAN	ES-CAN	I	<i>Phenacoccus manihoti</i>	Baez and Askew (1999)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Agonaspis citricola</i> Logvinovskaya, 1983	A	parasitic/ predator	Asia?	1966, IT- SIC	FR, ES, ES-CAN, GR, IL, IT, IT-SIC, PL	I, J100	Citrus leafminer, <i>Phyllocnistis citrella</i> , in <i>Citrus</i> orchards	Argov and Rössler (1996), Michelakis (1997), Siscaro et al. (1997), Siscaro and Mazzeo (1997), Urbaneja et al. (2000)
<i>Aloencyrtus saissetiae</i> (Compere, 1939)	A	parasitic/ predator	Africa	1987, IL	IL	I	<i>Saissetia oleae</i> on citrus.	Argov and Rössler (1988)
<i>Anagyrus agrandis</i> Saraswat, 1975	A	parasitic/ predator	Asia	1987, IL	IL	I	<i>Nipaecoccus viridis</i>	Bar-Zakay et al. (1987)
<i>Anagyrus fusciventris</i> (Girault, 1915)	A	parasitic/ predator	Australasia	1983, IT	BE, DE, DK, ES, FR, DE, IT, NL	J100	pseudococcids on Cycas, coffee, <i>Citrus</i>	Viggiani and Battaglia (1983)
<i>Anagyrus sawadai</i> Ishii, 1928	A	parasitic/ predator	Asia	1996, IL	IL	I	<i>Citrus</i> mealybug, <i>Pseudococcus cryptus</i>	Blumberg et al. (1999b)
<i>Anagyrus subflaviceps</i> (Girault, 1915)	A	parasitic/ predator	Australasia	1994, PT	ES, IL, PT	I	Pseudococcids	Simutnik et al. (2005)
<i>Anicetus annulatus</i> Timberlake, 1919	A	parasitic/ predator	North America	1977, HR	AL, HR	I	Scale insects on <i>Citrus</i>	Hoffer (1970), Hoffer (1982)
<i>Anicetus ceroplastis</i> Ishii, 1928	A	parasitic/ predator	Asia	1989, IL	IL	I	<i>Ceroplastes floridensis</i>	Blumberg (1977)
<i>Anthemus hilli</i> Dodd, 1917	A	parasitic/ predator	Australasia	1954, ES	ES	I	<i>Chionaspis graminis</i>	Gerling et al. (1980)
<i>Avetianella longoi</i> Siscaro, 1992	A	parasitic/ predator	Australasia	1990, PT	IT-SIC, IT, PT	I, G1	<i>Phoracantha</i> <i>semipunctata</i> (Oophagous)	Farrall et al. (1992), Longo et al. (1993), Siscaro (1992)
<i>Bothriophryne</i> <i>fuscicornis</i> Compere, 1939	A	parasitic/ predator	Africa	1972, IL	CZ, IL, SK	I, G	Various Coccidae	Kfir and Rosen (1980)
<i>Clausenia purpurea</i> Ishii, 1923	A	parasitic/ predator	Asia	1974, IL	IL, IT	I	Citriculus mealybug <i>Pseudococcus cryptus</i>	Guerrieri and Pellizzari (2009), Rosen (1974)

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<i>Coccidencyrtus malloi</i> Blanchard, 1964	A	parasitic/ predator	South America	1999, FR	FR, IT	J100	<i>Diaspis boisduvalii</i>	Panis and Pinet (1999a)
<i>Coccidoxenoides perminutus</i> Girault, 1915	A	parasitic/ predator	Asia	1956, IT	CY, GB, IL, IT	I, J100	<i>Planococcus ficus</i> and <i>P. citri</i>	Fry (1989), Noyes and Hayat (1994), Trijapitzin (1978), Viggiani (1975a), Zinna (1960)
<i>Comperia merceti</i> (Compere, 1938)	A	parasitic/ predator	South America	1988, FR	F, IT	J	<i>Supella longipalpa</i>	Goudey-Perrière et al. (1988), Goudey-Perrière et al. (1991)
<i>Comperiella bifasciata</i> Howard, 1906	A	parasitic/ predator	Asia	1990, IT	BE, CY, CZ, ES, FR, GR, HU, IL, IT, IT-SIC, MD, NL, RU, UA	I, J100	<i>Aonidiella aurantii</i> & <i>A. citrina</i> on Citrus & passionfruit	Bénassy and Bianchi (1974), Liotta and Salvia (1991), Orphanides (1996)
<i>Comperiella lemniscata</i> Compere & Annecke, 1961	A	parasitic/ predator	Asia	1989, IT	ES, IL, IT	I	<i>Chrysomphalus dictyospermi</i>	Battaglia (1988), Garonna and Viggiani (1989), Pina et al. (2001)
<i>Copidosoma floridanum</i> (Ashmead, 1900)	A	parasitic/ predator	North America	1920, GB	BG, CZ, DE, ES, ES-CAN, FR, DE, GB, GR-CRE, HU, IT, NL, PT, RU, RS, SE, SK	I	Noctuid moths (Polyembryonic)	Guerrieri and Noyes (2005), Noyes (1988)
<i>Copidosoma koehleri</i> Blanchard, 1940	A	parasitic/ predator	C & S America	1994, IT	AL, CY, GR, IT	I	<i>Phthorimea operculella</i>	Guerrieri (1995), Guerrieri and Noyes (2005)
<i>Diversinervus cervantesi</i> (Girault, 1933)	A	parasitic/ predator	Asia	1982, IL	IL	I	soft scale insects	Rosen and Alon (1983)
<i>Diversinervus elegans</i> Silvestri, 1915	A	parasitic/ predator	Africa	1977, IT	ES, FR, GR, IL, IT	I	black scale, <i>Saissetia oleae</i> , on olive, Citrus (polyphagous)	Kfir and Rosen (1980), Panis (1983), Viggiani and Mazzone (1977b)
<i>Encyrtus fuscus</i> (Howard, 1881)	A	parasitic/ predator	North America	1901, IT	IT	I, G3	<i>Lecanium</i> scales	Noyes and Hayat (1994)

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<i>Encyrtus infelix</i> (Embleton, 1902)	A	parasitic/ predator	Africa	1901, GB	BE, DE, DK, ES, FR, GB, IL, NL	I, J100	Coccids (<i>Saissetia</i> spp.) on Citrus, Ficus	Embleton (1902)
<i>Leptomastix dactylopii</i> Howard, 1885	A	parasitic/ predator	Africa	1959, IT	AT, BA, BE, CY, CZ, DE, DK, ES, FI, FR, DE, GB, GR, IE, IL, IT, IT- SAR, IT-SIC, NL, NO, PL, PT, SE, YU	I, J100	Mealybugs (<i>Planococcus citri</i>) on many host plants (polyphagous)	Krambias and Kotzionis (1980), Longo and Benfatto (1982), Luppino (1979), Mineo and Viggiani (1976), Viggiani (1975b)
<i>Metaphycus angustifrons</i> Compere, 1957	A	parasitic/ predator	Asia	1988, IL	IL	I2	Coccids on Nerium oleander, Asteraceae, <i>Cupressus</i> spp., <i>Leonotis leoneurus</i> , <i>Olea europaea</i> , <i>Leucadendron</i> <i>pubescens</i> , <i>Lycium</i> <i>tetrandrum</i>	Triapitzin (1989)
<i>Metaphycus annekei</i> Guerrieri & Noyes, 2000	A	parasitic/ predator	Africa	1973	CY, ES, GR, IL, IT, PL, PT	I2	Coccids on <i>Nerium</i> <i>oleander</i> , Asteraceae, <i>Cupressus</i> spp., <i>Leonotis</i> <i>leoneurus</i> , <i>Olea</i> <i>europaea</i> , <i>Leucadendron</i> <i>pubescens</i> , <i>Lycium</i> <i>tetrandrum</i>	Guerrieri and Noyes (2000)
<i>Metaphycus flavus</i> (Howard, 1881)	A	parasitic/ predator	North America	1915, FR	AL, CY, CZ, FR, ME, PT-MAD, PT, RU, ES-BAL	I	soft scales (Facultative gregarious parasitoid)	Monaco and D'Abbicco (1987), Noguera et al. (2003), Orphanides (1988), Tena-Barreda and Garcia-Mari (2006), Velimirovic (1994)

Families <i>Species</i>	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Metaphycus galbus</i> Annecke, 1964	A	parasitic/ predator	Africa	1993, ES	ES	I	<i>Protopulvinaria pyriformis</i> on avocado	Guerrieri and Noyes (2000)
<i>Metaphycus belvolus</i> (Compere, 1926)	A	parasitic/ predator	Africa	1978, IT	AT, BE, CH, CY, DE, DK, ES, FR, FR-COR, GR, IL, IT, NL, SE	J100	Scale insects. Only in greenhouses	Argyriou and Katsoyannos (1976), Carrero (1980), Mazzone and Viggiani (1983), Montiel and Santaella (1995), Panis (1983), Panis et al. (1977), Stratopoulou and Kapatos (1984), Viggiani (1978)
<i>Metaphycus invisus</i> Compere, 1940	A	parasitic/ predator	Africa	1987, IT- SAR	ES, ES-BAL, IL	I2	Black scale, <i>Saissetia</i>	Argov and Rössler (1988), Guerrieri and Noyes (2000)
<i>Metaphycus lounsburyi</i> (Howard, 1898)	A	parasitic/ predator	Africa	1973, IT	CY, DK, ES, FR, IL, IT, IT-SIC, NL, PL	I2, J100	Black scale, <i>Saissetia oleae</i> , polyphagous on olive, citrus	Argyriou and Michelakis (1975), Canard and Laudeho (1977), Monaco (1976), Monaco and D'Abbicco (1987), Orphanides (1988), Panis (1977), Panis and Marro (1978), Tena-Barreda and Garcia-Mari (2006)
<i>Metaphycus luteolus</i> (Timberlake, 1916)	A	parasitic/ predator	North America	1989, IT	ES, IT, UA	I2	Fruit scales	Guerrieri and Noyes (2000), Viggiani and Guerrieri (1988)
<i>Metaphycus maculipennis</i> (Timberlake, 1916)	A	parasitic/ predator	North America	1988, IT	DE, ES, FR, GR, IT, RS		Coccidae on <i>Vitis</i>	Guerrieri and Noyes (2000)
<i>Metaphycus orientalis</i> (Compere, 1924)	A	parasitic/ predator	Asia	1989, BE	BE	I	Coccidae on <i>Citrus</i>	Guerrieri and Noyes (2000)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Metaphycus stanleyi</i> Compere, 1940	A	parasitic/ predator	Africa	1960, IT	ES-CAN, ES, GR, IL, IT	I2	fruit scales	Argov and Rössler (1988), Blumberg et al. (1993), Guerrieri and Noyes (2000), Noyes and Hayat (1994), Triapitzin (1989)
<i>Metaphycus swirskii</i> Annecke & Mynhardt, 1979	A	parasitic/ predator	Africa	1976, IT	ES, FR, GR, GR- CRE, IL, IT, NL	I2	scales on <i>Ficus</i> , <i>Citrus</i> , Coffee, <i>Solanum</i>	Annecke and Mynhardt (1979a), Panis (1981), Viggiani and Mazzone (1977b)
<i>Microterys clauseni</i> Compere, 1926	A	parasitic/ predator	Asia	1987, IL	IL	I	<i>Ceroplastes floridensis</i> on <i>Citrus</i>	Argov and Rössler (1988)
<i>Microterys nietneri</i> (Motschulsky, 1859)	A	parasitic/ predator	Asia	1989, BG	BG, PT-AZO	I2	<i>Coccus</i>	Simoes et al. (2006)
<i>Microterys speciosus</i> Ishii, 1923	A	parasitic/ predator	Asia	1987, IL	IL	I	<i>Ceroplastes floridensis</i> on Citrus	Argov and Rössler (1988)
<i>Neodusmetia sangwani</i> (Subba Rao, 1957)	A	parasitic/ predator	Asia	1974, IL	IL	E	Rhodesgrass scale, <i>Antonina graminis</i>	Gerson et al. (1975)
<i>Ooencyrtus kuwanae</i> (Howard, 1910)	A	parasitic/ predator	Asia Temperate	1932, PT	AT, BA, BG, CH, CZ, DE, ES, FR, IT-SAR, MD, PL, PT, RO, RU, SK, UA, YU	G1	<i>Lymantria dispar</i>	Bjegovic (1962), Keremidchiev et al. (1980), Mihalache et al. (1995), Milanovic et al. (1998), Roversi et al. (1991)
<i>Plagiomerus diaspidis</i> Crawford, 1910	A	parasitic/ predator	North America	1994, IT- SIC	ES-CAN, FR, IT- SIC, PT-MAD	I	Diaspididae on <i>Opuntia</i>	Bue and Colazza (2005), Panis and Pinet (1999b), Russo and Siscaro (1994)
<i>Prochiloneurus</i> <i>pulchellus</i> Silvestri, 1915	A	parasitic/ predator	Africa	1972, IL	IL, IT	I	scale insects (polyphagous)	Triapitzin (1989)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Pseudaphycus angelicus</i> (Howard, 1898)	A	parasitic/ predator	Tropical, subtropical	1964, IL	IL, RU	I, J100	Pseudococcids (<i>Vitis</i> , <i>Solanum</i>)	Noyes and Hayat (1994), Walton and Pringle (2002)
<i>Pseudaphycus malinus</i> Gahan, 1946	A	parasitic/ predator	Asia- Temperate	1998, IL	IL, RU	I, J100	Pseudococcids on <i>Citrus</i>	Blumberg et al. (1999a)
<i>Pseudectroma signatum</i> (Prinsloo, 1982)	A	parasitic/ predator	Africa	1986, IL	IL	I2	<i>Nipaecoccus viridis</i> on <i>Citrus</i>	Bar-Zakay et al. (1987)
<i>Psyllaephagus pilosus</i> Noyes, 1988	A	parasitic/ predator	Australasia	2006, FR- COR	FR, FR-COR, GB, IE, IT	I2	<i>Ctenarytaina eucalypti</i> on <i>Eucalyptus</i>	Bennett (2005), Chauzat et al. (2002), Costanzi et al. (2003a), Costanzi et al. (2003b), Malausa and Girardet (1997), Schnee et al. (2006)
<i>Rhopus nigroclavatus</i> (Ashmead, 1902)	A	parasitic/ predator	North America	1978, ES	ES	I	scale insects on Poaceae	Triapitzin (1989)
<i>Tachinaephagus</i> <i>zealandicus</i> Ashmead, 1904	A	parasitic/ predator	Australasia	2002, PT- MAD	DK, IT, PT-AZO, PT-MAD	J	<i>Musca domestica</i> in poultry houses	Japoshvili and Noyes (2006), Koponen and Askew (2002), Turchetto et al. (2003)
<i>Tetraneemoidea</i> <i>brevicornis</i> (Girault, 1915)	A	parasitic/ predator	Australasia	1987, IT	FR, IT	I, J100	citrus mealybug, <i>Pseudococcus</i> <i>calceolariae</i>	Laudonia and Viggiani (1986a)
<i>Tetraneemoidea</i> <i>peregrina</i> (Compere, 1939)	A	parasitic/ predator	C & S America	1994, PT	ES, FR, IL, IT, PT	I, J100	citrus mealybug, <i>Pseudococcus</i> <i>calceolariae</i>	Triapitzin (1989)
<i>Tineophoctonus armatus</i> (Ashmead, 1888)	A	parasitic/ predator	North America	1963, ES	ES, IT	J	Anobiidae	Triapitzin (1989)
<i>Zarhopalus sheldoni</i> Ashmead, 1900	A	parasitic/ predator	North America	1945, RU	RU	J100	<i>Pseudococcus comstocki</i>	Noyes and Hayat (1994)

Families <i>Species</i>	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
Eulophidae								
<i>Aceratoneuromyia indica</i> (Silvestri, 1910)	A	parasitic/ predator	Australasia	1974, IT	GB, IT	I, J100	fruit flies, <i>Anastrepha</i>	Graham (1991), Viggiani (1975a)
<i>Aprostocetus ceroplastae</i> (Girault, 1916)	A	parasitic/ predator	Africa	1962, IL	FR, GR, IL, IT	I	Coccidae (Ceroplastes) on fruit trees	Argyriou and Kourmadas (1980), Avidov et al. (1963), Domenichini et al. (1964)
<i>Aprostocetus diplosidis</i> Crawford, 1907	A	parasitic/ predator	North America	1964, IT	IT	E	<i>Contarinia sorghicola</i>	Priore and Viggiani (1965)
<i>Aprostocetus microcosmus</i> (Girault, 1917)	A	parasitic/ predator	North America	1977, ES-CAN	ES-CAN	I	Cecidomyiidae on Poaceae	Graham (1987)
<i>Aprostocetus sicarius</i> (Silvestri, 1915)	A	parasitic/ predator	Africa	1962, IL	IL, ME	I	<i>Bactrocera oleae</i>	Avidov et al. (1963), OILB (1971)
<i>Astichus trifasciatiipennis</i> (Girault, 1913)	A	parasitic/ predator	Australasia	1989, IT	IT	G5	Gracillariidae on <i>Robinia pseudoacacia</i>	Serini (1990)
<i>Ceraninus americanus</i> (Girault, 1917)	A	parasitic/ predator	North America	1994, NL	NL	I	Thrips	Loomans et al. (1995)
<i>Ceraninus russelli</i> (Crawford, 1911)	A	parasitic/ predator	North America	1954, GB	GB	I	Thrips	Thompson (1955)
<i>Chaenotetrastichus semiflavus</i> (Girault, 1917)	A	parasitic/ predator	North America	1995, DE	DE	G	Pompilidae	Vidal (1996)
<i>Chouioia cunea</i> Yang, 1989	A	parasitic/ predator	Asia	1990, IT	IT	G1	<i>Hyphantria cunea</i>	Boriani (1991)
<i>Chrysocharis ainsliei</i> Crawford, 1912	A	parasitic/ predator	North America	1984, IT	DK, IT	I	<i>Phytomyza</i> on artichokes	Hansson (1985), Ikeda (1996)
<i>Chrysocharis oscinidis</i> Ashmead, 1888	A	parasitic/ predator	North America	1984, NL	FR, NL	I	<i>Liriomyza</i>	Fry (1989), Woets and Linden (1985)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Cirrospilus ingenuus</i> Gahan, 1932	A	parasitic/ predator	Asia	1994, IL	CY, ES, IL, PT- MAD, PT	I	<i>Phyllocnistis citrella</i> in <i>Citrus</i> orchards	Argov and Rössler (1996), Vercher et al. (2000)P
<i>Citrostichus phyllocnistoides</i> (Narayanan, 1960)	A	parasitic/ predator	Asia	1995, IL	ES-BAL, GR, IL, IT, IT-SIC, IT, PT	I	<i>Phyllocnistis citrella</i> in <i>Citrus</i> orchards	Argov and Rössler (1996), Barbagallo et al. (2000), Michelakis and Vacante (1997), Vercher et al. (2000)
<i>Closterocerus cinctipennis</i> Ashmead, 1888	A	parasitic/ predator	North America	1971, IT	IT	G5	<i>Parectopa robinella</i> on <i>Robinia</i>	Vidano and Marletto (1972)
<i>Diglyphus begini</i> (Ashmead, 1904)	A	parasitic/ predator	North America	1988, CZ	CZ, NO	I	Leafminer parasitoid	Hagvar et al. (1994), Kalina (1989)
<i>Edovum puttleri</i> Grissell, 1981	A	parasitic/ predator	C & S America	1985, IT	IT, RU	I1	Colorado potato beetle	Laudonia and Viggiani (1986b), Yefremova (2002)
<i>Elachertus cidariae</i> (Ashmead, 1898)	A	parasitic/ predator	North America	1962, YU	YU	G1	fall webworm in deciduous trees	Tadic MD (1964)
<i>Euderus cavaeolae</i> (Silvestri, 1914)	A	parasitic/ predator	Africa	1954, IT	IT	I	<i>Bactrocera oleae</i>	Thompson (1955)
<i>Galeopsomyia fausta</i> LaSalle, 1997	A	parasitic/ predator	C & S America	1999, ES	ES	I2	<i>Phyllocnistis citrella</i> on <i>Citrus</i>	Vercher et al. (2000)
<i>Goetheana shakespearei</i> Girault, 1920	A	parasitic/ predator	Australasia	1992, ES	ES	I	Thrips	Viggiani and Nieves Aldrey (1993)
<i>Hyssopus thymus</i> Girault, 1916	A	parasitic/ predator	North America	1970, DE	DE	G3, I2	<i>Rhyacionia buoliana</i> pine stands	Konig and Bogenschutz (1971)
<i>Leptocybe invasa</i> Fisher & LaSalle, 2004	A	phyto- phagous	Australasia	2003, PT	ES, FR, FR-COR, IL, IT, PT	G1	gall-former on <i>Eucalyptus</i>	Anagnou-Veroniki et al. (2008), Kim et al. (2008), Mendel et al. (2004), Protasov et al. (2008)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Ophelimus maskelli</i> (Ashmead 1900)	A	phyto- phagous	Australasia	2000, IT	ES, FR, FR-COR, GR, IL, IT, PT	G1	gall-former on <i>Eucalyptus camaldulensis</i> (N), other <i>Eucalyptus</i> (I)	Branco et al. (2009), Protasov et al. (2007a), Protasov et al. (2007b), Rizzo et al. (2006), Sasso et al. (2008)
<i>Pediobius phylloretae</i> (Riley, 1884)	A	parasitic/ predator	North America	1944, CZ	CZ, DE, GB	I	<i>Phylloreta zimmermanni</i>	Boucek (1965)
<i>Quadrastichodella nova</i> Girault, 1922	A	phyto- phagous	Australasia	1968, IL	ES, FR-COR, IL, IT, IT-SAR, PT	G1	gall-former on <i>Eucalyptus</i>	Boucek (1977a), Rasplus (1992)
<i>Semiolachra petiolata</i> (Girault, 1915)	A	parasitic/ predator	Australasia	1995, IL	CY, ES, ES-BAL, GR, IL, IT, IT-SIC, PT	I2	<i>Phyllocnistis citrella</i> on <i>Citrus</i>	Argov and Rössler (1996), Barbagallo et al. (2000), Michelakis and Vacante (1997), Siscaro et al. (1999)
<i>Tetrastichomyia clisiocampae</i> (Ashmead, 1894)	A	parasitic/ predator	North America	1966, IT	IT	G1, I	Lepidoptera	Domenichini (1967)
<i>Thripobius javae</i> (Girault, 1917)	A	parasitic/ predator	Asia	1995, IT	BE, DE, DK, FR, IL, IT, IT-SIC, NL	J100	Greenhouse thrips on <i>Citrus</i> , <i>Viburnum</i> , <i>Vitis</i> and others	Viggiani and Bernardo (1996), Wysoki et al. (2000)
Eupelmidae								
<i>Anastatus japonicus</i> Ashmead, 1904	A	parasitic/ predator	Asia	1920, HU	CZ, HU, SK, YU	G1	<i>Lymantria</i> and forest moths	Ruschka (1921)
<i>Anastatus tenuipes</i> Bolivar & Pieltain, 1925	A	parasitic/ predator	Africa	1999, IT	IT	J	<i>Supella longipalpa</i> (Blattidae)	Russo et al. (2000)
<i>Eupelmus afer</i> Silvestri, 1914	A	parasitic/ predator	Africa	1974, IT	IT	I	<i>Bactrocera oleae</i>	Viggiani (1975a)

Families <i>Species</i>	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Eupelmus australiensis</i> (Girault, 1913)	A	parasitic/ predator	Australasia	1964, IT	IT, SK, UA, YU	I, I1, F5	sorghum midge (Cecidomyiidae) and other midge on Poaceae	Boucek (1977b), Kalina (1989), Priore and Viggiani (1965), Trjapitzin (1978)
<i>Eupelmus longicarpus</i> Girault, 1915	A	parasitic/ predator	Australasia	1987, ES	ES	I	midge on Poaceae	Bouček (1988)
Eurytomidae								
<i>Bruchophagus sophorae</i> Crosby & Crosby, 1929	A	phyto- phagous	Asia	1960, RO	BG, HU, RO, RS, RU, SK, UA, YU	I2	<i>Sophora</i> seeds	Grubik (1992), Mihajlovic (1983), 3871996477
<i>Eurytoma aloineae</i> (Burks, 1958)	A	phyto- phagous	Africa	1957, DE	DE	J100	<i>Aloe</i>	Burks (1958)
<i>Eurytoma orchidearum</i> (Westwood, 1869)	A	phyto- phagous	North America	1962, FR	DK, FR, NL	J100	<i>Cattleya</i> and other orchids	Gijswijt (2003), Peck (1963)P
<i>Prodecatoma cooki</i> (Howard, 1896)	A	phyto- phagous	North America	1886, AT	AT	I	Grape wasp, <i>Vitis</i>	Howard (1896)
<i>Tetramesa albomaculatum</i> (Ashmead, 1894)	A	phyto- phagous	North America	1977, GB	BG, DE, GB, SE	I1	Wheat and Poaceae	Boucek and Graham (1978), Hedqvist (2003), Stojanova (2004), Vidal (2001)
<i>Tetramesa maderae</i> (Walker, 1849)	A	phyto- phagous	North America	1870, IT	ES, HU, IL, IT, RO, RU, UA	I1	wheat and Poaceae	Popescu (2004), Porchinsky (1881), Walker (1871)
<i>Tetramesa swezevi</i> (Phillips & Poos, 1922)	A	phyto- phagous	Unknown	1977, RU	RU, UA	I1	wheat and Poaceae	Zerova (1978)
Figitidae								
<i>Aganaspis daci</i> (Weld, 1951)	A	parasitic/ predator	Africa	1970, FR	FR, GR_NEG	I	<i>Bactrocera oleae</i>	Nunez-Bueno (1982), Papadopoulos and Katsoyannos (2003)

Families <i>Species</i>	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
Formicidae								
<i>Brachymyrmex heeri</i> Forel, 1874	A	parasitic/ predator	C & S America	1874, CH	CH, DE, FR, UA	J100	Greenhouses	Forel (1874)
<i>Cardiocondyla emeryi</i> Forel, 1881	A	parasitic/ predator	Africa	1894, PT	ES-CAN, PT-MAD	G, I2, J1, X24	Natural sites and gardens, arid sites	Heinze and Trenkle (1997), Kluger (1983), Reyes-Lopez et al. (2008), Wetterer et al. (2007)
<i>Cardiocondyla mauritanica</i> Forel, 1890	A	parasitic/ predator	Africa	1981, ES- CAN	CY, ES, ES-CAN, IL, IT, IT-SAR, IT- SIC PT-MAD	I2, X24, J1	Gardens, houses, buildings	Finzi (1936), Mei (1995), Wetterer et al. (2007)
<i>Cardiocondyla obscurior</i> (Wheeler, 1929)	A	parasitic/ predator	Africa	1930, IL	ES-CAN, IL	I2	Miscellaneous habitats, disturbed areas, beaches	Seifert (2003)
<i>Cardiocondyla wroughtoni</i> (Forel, 1890)	A	parasitic/ predator	Asia	1982, IL	IL	H5, J	Miscellaneous habitats, disturbed areas	Kluger (1983)
<i>Crematogaster brevispinosa</i> Mayr, 1870	A	parasitic/ predator	C & S America	1935, CZ	CZ	J100	Greenhouses	Šefrová and Laštůvka (2005)
<i>Hypoponera ergatandria</i> (Forel, 1893)	A	parasitic/ predator	C & S America	1952, DE	DE, FR	J	Sparse or no vegetation, buildings	Geiter et al. (2002)
<i>Hypoponera punctatissima</i> (Roger, 1859)	A	parasitic/ predator	Tropical, subtropical	1847, PT	AT, BE, BG, CH, CZ, DE, DK, ES, ES-CAN, FR, FR- COR, GB, GR, HU, IE, IS, IT, LU, MT, NL, NO, PT, PT-AZO, PT-MAD, RO, RS, RU, SE, SK, UA, YU	J, J100, I2, X24	Antropophilic, in greenhouses or other heated buildings, gardens in Madeira	Blacker (2007), Boer et al. (2003), Boer et al. (2006), Carniel and Governatori (1994), Czechowska and Czechowski (1999b), Dessart and Cammaerts (1995), Jones (1997), Seifert (1982), Wetterer et al. (2007)

Families <i>Species</i>	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Lasius neglectus</i> Van Loon, Boomsma & Andrasfalvy, 1990	A	parasitic/ predator	Asia- Temperate	1973, HU	BE, BG, CZ, DE, ES, FR, GL, HU, PL, PT	I2, X24	Polygynous species, parks and gardens	Boomsma et al. (1990), Czechowska and Czechowski (1999a), Czechowska and Czechowski (2003), Dekoninck et al. (2002), Espadaler (1999), Markó (1988), Neumeyer (2008), Schultz and Busch (2009), Seifert (1992), Seifert (2000), Van Loon et al. (1990)
<i>Lasius turcicus</i> Sanctchi, 1921	A	parasitic/ predator	Asia- Temperate	1970, HU	AL, BE, BG, CZ, DE, DK, EE, ES, ES-CAN, FR, GR, HU, IT, PL, RO	I2, X24	Gardens	Seifert (1996)
<i>Linepithema humile</i> (Mayer, 1868)	A	parasitic/ predator	C & S America	1847, PT	BE, BG, CH, CZ, DE, ES, ES-CAN, FR, FR-COR, GB, IT, IT-SAR, IT-SIC, PL, PT, PT-AZO, PT-MAD	J, G, I2	Various habitats indoors and outdoors	Giraud et al. (2002), Suarez et al. (2001), Wild (2004), Wild (2009)
<i>Linepithema leucomelas</i> Emery, 1894	A	parasitic/ predator	C & S America	1955, AT	AT	J100	Gardens, greenhouses	Wild (2007)
<i>Monomorium andrei</i> Saunders, 1890	A	parasitic/ predator	Africa	1924, ES	ES, ES-BAL	J	Urban environment	Reyes Lopez and Luque Garcia (2003)
<i>Monomorium destructor</i> (Jerdon, 1851)	A	parasitic/ predator	Asia	1892, ES- BAL	ES-BAL, PL, PT	J1	Urban environment	Boer and Vierbergen (2008), Salgueiro (2003), Šefrová and Laštůvka (2005), Wetterer (2009a), Yarrow (1967)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Monomorium floricola</i> (Jerdon, 1851)	A	parasitic/ predator	Asia- Tropical	1982, DE	DE	J100	Greenhouses	Sellenschlo (1991)
<i>Monomorium pharaonis</i> (Linnaeus, 1758)	A	parasitic/ predator	tropical	1892, ES	AT, BG, CH, CZ, DE, DK, EE, ES-CAN, FR, FR- COR, GB, HU, IL, IT, IT-SAR, IT-SIC, LT, ME, NL, NO, PT-MAD, PT, RS	J1, J100, X25, I2	Stored products antrophilic, mainly indoors, gardens in Madeira	Markó et al. (2006), Salgueiro (2003)
<i>Monomorium salomonis</i> (Linnaeus, 1758)	A	parasitic/ predator	tropical	1881, FRL	ES, ES-BAL, FR, GB, IT, IT-SAR, IT-SIC, MT	F6, J100	Garrigue	Salgueiro (2003)
<i>Pachycondyla darwini</i> Forel, 1893	A	parasitic/ predator	Unknown	Unknown, MT	MT	U	Forested areas	
<i>Paratrechina bourbonica</i> (Forel, 1886)	A	parasitic/ predator	Tropical, subtropical	Unknown, GB	GB	U	Cosmopolitan, tropics	Fitton et al. (1978)
<i>Paratrechina flavipes</i> (Smith, 1874)	A	parasitic/ predator	Asia- Tropical	1952, DE	DE, ES	J1	Buildings	Espadaler and Collingwood (2000)
<i>Paratrechina jaegerskioeldi</i> (Mayr, 1904)	A	parasitic/ predator	Africa	1989, ES- MAD	ES, ES-CAN, GR- CRE, PT-MAD	J2, I2, X24	Low constructed buildings, gardens	Collingwood (1993), Espadaler and Bernal (2003), Kluger (1988)
<i>Paratrechina longicornis</i> (Latreille, 1802)	A	parasitic/ predator	Africa	1847, ES- MAD	CH, CZ, DE, ES, ES-CAN, FI, FR, GB, IL, IT, MT, PT- AZO, PT-MAD	H, I2, J1, J100	Houses, buildings, plant cavities, trees, debris, rotten wood	Collingwood et al. (1997), Espadaler and Bernal (2003), Freitag et al. (2000), Heinze (1986), Tinaut and Año (2000)
<i>Paratrechina vividula</i> (Nylander, 1846)	C	parasitic/ predator	Crypto- genic	1881, FI	CY, CZ, DE, FI, FR, GB, GR, NL, RU, SE, UA	J, J100	Constructed areas, greenhouses	Collingwood and Hughes (1987)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Pheidole bilimeki</i> Mayr 1870	A	parasitic/ predator	C & S America	1952, DE	CH, DE, DK, FR, GB	J100	Greenhouse	Longino and Cox (2009)
<i>Pheidole guineensis</i> (Fabricius, 1793)	A	parasitic/ predator	Tropical, subtropical	1883, FR	FR, DE	J100	Sparsely wooded area (N), greenhouse(I)	
<i>Pheidole megacephala</i> (Fabricius, 1793)	A	parasitic/ predator	Africa	1847, PT- MAD	DE, ES, ES-CAN, FR, GB, GR, GR- CRE, IT, ME, PT, PT-AZO, PT-MAD, RO, YU	I2, J1, J100	Gardens, urban	Bernard (1968), Limonta and Colombo (2003)
<i>Pheidole noda</i> (Smith, 1874)	A	parasitic/ predator	Asia	2003, IT	IT	I2	Nursery	Limonta and Colombo (2003)
<i>Pheidole teneriffana</i> Forel, 1893	A	parasitic/ predator	Africa	1893, ES- BAL	ES, ES-BAL, ES- CAN, GR, GR- CRE, GR_SEG, GR, IT-SIC	I2, X24	Disturbed areas	De Haro et al. (1986), Gomez and Espadaler (2006)
<i>Plagiolepis alluaudi</i> (Emery, 1894)	A	parasitic/ predator	Asia- Temperate	1915, IE	CH, DE, FR, IE	J100	Greenhouses	Geiter et al. (2002)
<i>Plagiolepis exigua</i> Forel, 1894	A	parasitic/ predator	Tropical, subtropical	1952, DE	DE	J100	Greenhouses	Geiter et al. (2002)
<i>Plagiolepis obscuriscapa</i> Santschi, 1923	A	parasitic/ predator	C & S America	Unknown	IT, RO	U	Unknown	Moscaliuc (2009)
<i>Pyramica membranifera</i> (Emery, 1869)	A	parasitic/ predator	Africa	1989, PT- MAD	PT-MAD	I2, X24	Gardens	Espadaler (1979), Espadaler and Lopez Soria (1991)
<i>Strumigenys lewisi</i> Cameron, 1886	A	parasitic/ predator	Asia	1996, MT	MT	J100	Greenhouses	Schembri and Collingwood (1995)
<i>Strumigenys rogeri</i> Emery, 1890	A	parasitic/ predator	Africa	Unknown	DE, GB	J100	Greenhouses	

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Strumigenys silvestrii</i> Emery, 1906	A	parasitic/ predator	North America	1989, PT- MAD	PT-MAD	I2, X24	Gardens; predator on collembola	Geiter et al. (2002)
<i>Tapinoma melanocephalum</i> (Fabricius, 1793)	A	parasitic/ predator	Tropical, subtropical	1984, DE	AT, CH, DE, FI, GB, RU	J1, J100	stored products, antropophilic, indoors only	Boer and Vierbergen (2008), Espadaler and Espejo (2002), Högmo (2003b), Jucker et al. (2008), Scheurer and Liebig (1998), Sorvari (2002), Vipin et al. (1999), Wetterer (2009b)
<i>Technomyrmex albipes</i> (Smith, 1861)	A	detrivorous	Asia- Tropical	1989, PT- MAD	AT, NL, PT-MAD	I2, X24, J1	Gardens, houses	Boer and Vierbergen (2008)
<i>Technomyrmex detorquens</i> (Walker, 1859)	A	parasitic/ predator	Asia	1937, CZ	AT, CZ, DE	J100	Greenhouses, houses	Šefrová and Laštůvka (2005)
<i>Temnothorax longispinosus</i> Roger, 1863	A	parasitic/ predator	North America	Unknown, ES	ES	D6	Oak and mixed woodland	
<i>Tetramorium bicarinatum</i> (Nylander, 1846)	A	parasitic/ predator	Asia- Tropical	2003, IT	DE, IT, PT-AZO, SE	J100	Nurseries	Högmo (2003a), Reyes and Espadaler (2005), Wetterer et al. (2004)
<i>Tetramorium insolens</i> (Smith, 1861)	A	parasitic/ predator	Asia, ATstralia	Unknown	AT, FR, NL, PL	J100	Greenhouses	de Jonge (1985), Radchenko et al. (1998), Radchenko et al. (1999)
<i>Tetramorium lanuginosum</i> Mayr, 1870	A	parasitic/ predator	Asia	Unknown	IL, MT	J100	Greenhouses s	Reyes and Espadaler (2005), Schembri and Collingwood (1995)
<i>Tetramorium simillimum</i> (Smith, 1851)	A	parasitic/ predator	Tropical, subtropical	Unknown	DE, EE, FR, GB, IL, PL, PT-AZO, PT-MAD, GB	J100	Greenhouses	Bernard (1968), Wetterer et al. (2006)

Families <i>Species</i>	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
Ichneumonidae								
<i>Auberteterus alternecoloratus</i> (Cushman, 1929)	A	parasitic/ predator	Asia- Temperate	Unknown	FR, R	I	Stem borers (Pyralidae)	Gokhman (1996)
<i>Cryptus luctuosus</i> Cresson, 1864	A	parasitic/ predator	North America	Unknown	AT, FR, RU	G3	Sawflies on <i>Tsuga</i>	
<i>Cteniscus dorsalis</i> Cresson, 1864	A	parasitic/ predator	North America	Unknown	FR, NO	G3	Sawflies	
<i>Delomerista novita</i> (Cresson, 1870)	A	parasitic/ predator	North America	Unknown	AT, DE, FI, GB, NL, NO, PL, RU	G3	Sawflies (Diprionidae and others)	Hedstrom (1987), Jussila (1989), Phillips (1997)
<i>Ephialtes spatulatus</i> (Townes, 1960)	A	parasitic/ predator	North America	Unknown	AT, PL, RU, SE	G3	Xylophagous beetles	Hedstrom (1987)
<i>Itopectis conquistator</i> (Say, 1835)	A	parasitic/ predator	North America	Unknown, DE	DE	I	Apple tortricid	Biermann (1973)
Megachilidae								
<i>Osmia cornifrons</i> (Radoszkowski, 1887)	A	phyto- phagous	Asia- Temperate	1970, DK	DK	I, E	Pollinator of fruit trees	Kristjansson and Rasmussen (1990)
Mymaridae								
<i>Anaphes nitens</i> (Girault, 1928)	A	parasitic/ predator	Australasia	1977, IT	ES, FR, IT, PT	I2	<i>Eucalyptus</i> snout-beetle <i>Gonipterus scutellatus</i> (egg Parasitoid)	Arzone and Vidano (1978), Cadahia (1986), Rivera et al. (1999), Vaz et al. (2000)
<i>Polynema striaticorne</i> Girault, 1911	A	parasitic/ predator	North America	1966, IT	IT	I2	<i>Ceresa bubalus</i>	Vidano (1968)
Pamphiliidae								
<i>Cephalcia alashanica</i> (Gussakovskij, 1935)	A	phyto- phagous	Asia- Temperate	1986, NL	NL	G3	<i>Picea</i>	Battisti and Sun (1996), Gossner et al. (2007), Holusa et al. (2007), Jachym (2007), Shinohara and Zombori (2003)

Families <i>Species</i>	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
Perilampidae								
<i>Steffanolampus salicetum</i> (Steffan, 1952)	A	parasitic/ predator	North America	1876, AT	AT	G	<i>Ptilinus</i> (Anobiidae)	Giraud and Laboulbène (1878)
Platygastridae								
<i>Amitus fuscipennis</i> MacGown & Nebeker, 1978	A	parasitic/ predator	North America	1980, IT	IT	J100	<i>Trialeurodes vaporariorum</i>	Manzano et al. (2002), Viggiani (1997), Vis and Lenteren (2008)
<i>Amitus spiniferus</i> (Brèthes, 1914)	A	parasitic/ predator	Tropical, subtropical	1971, FR	ES, FR, IT, IT-SIC	J100	<i>Aleurothrixus floccosus</i>	DeBach and Rose (1976a), Liotta et al. (2003)
Pteromalidae								
<i>Anisopteromalus calandrae</i> (Howard, 1881)	C	parasitic/ predator	Crypto- genic	1911, AT	AT, BE, CH, CZ, DE, FR, GB, GR, HU, IL, IT, PT, RO, RU, RS, SE, SK	J	Stored products beetles	Beratliet (1967), Boucek (1977b), Boucek and Graham (1978), Frilli (1965), Garrido-Torres and Nieves-Aldrey (1990), Hedqvist (2003), Kalina (1989), Mitroiu (2001), Ruschka (1912)
<i>Halticoptera daci</i> Silvestri, 1914	A	parasitic/ predator	Africa	1957, IT	IT	I	<i>Bactrocera oleae</i>	Thompson (1958)
<i>Mesopolobus modestus</i> (Silvestri, 1914)	A	parasitic/ predator	Africa	1974, IT	IT	I	<i>Bactrocera oleae</i>	Viggiani (1975a)
<i>Mesopolobus pinus</i> Hussey, 1960	A	parasitic/ predator	North America	1953, GB	BE, DK, FR, GB, NL, PL, SE	G3	<i>Megastigmus</i> seed chalcid in <i>Abies</i> seeds	Bak (1999), Pettersen (1976), Skrzypczynska (1989), Wisniowski (1987)
<i>Mesopolobus spermotrophus</i> Husey, 1960	A	parasitic/ predator	North America	1952, GB	BE, CZ, DE, FR, GB, IT, LU, NL, PL, SE	G3	<i>Megastigmus</i> seed chalcid in Douglas-fir seeds	Graham (1969)

Families <i>Species</i>	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Monoksa dorsiplana</i> Boucek, 1991	A	parasitic/ predator	C & S America	1980, IL	IL	U	Seed-beetles	Boucek (1991)
<i>Moranila californica</i> (Howard, 1881)	A	parasitic/ predator	Australasia	1973, IT	ES, ES-CAN, FR, GR, IL, IT, IT-SIC, IT	G, I2, F	Scales, <i>Quercus</i> , <i>Citrus</i> , <i>Fagus</i> , <i>Olea</i> (Highly polyphagous)	Raspi (1988), Simoes et al. (2006), Stratopoulou et al. (1981)
<i>Muscidifurax raptor</i> Girault & Sanders, 1910	A	parasitic/ predator	North America	1954, CZ	CZ, DE, DK, ES, IT, RO	J	<i>Musca domestica</i> and stable flies	Fabritius (1978), Fabritius (1981), Rutz and Axtell (1979)
<i>Paracarotomus</i> <i>cephalotes</i> Ashmead, 1894	A	parasitic/ predator	North America	1976, FR	FR, IT, RU,			Boucek (1976), Dzhanokmen (1984)
<i>Spalangia cameroni</i> , Perkins 1910	A	parasitic/ predator	North America	1969, DK	CY, CZ, DE, DK, ES, IT, MD, RO, SE	J	<i>Musca domestica</i> and stable flies	Falco et al. (2006), Gibson (2009), Maini and Bellini (1991), Tormos et al. (2009)
<i>Theocolax elegans</i> (Westwood, 1874)	C	parasitic/ predator	Crypto- genic	1957, DE	BE, DE, GR,	J	Stored products beetles	Eliopoulos et al. (2002), Mitroiu (2001), Thompson (1958)
<i>Urolepis rufipes</i> (Ashmead, 1896)	A	parasitic/ predator	North America	1989, DE	DE, DK, SE	J	house flies (pupae)	Gibson (2000), Hedqvist (2003), Skovgard and Jespersen (1999)
Scelionidae								
<i>Duta tenuicornis</i> (Dodd, 1920)	A	parasitic/ predator	Australasia	1989, HU	HU, MD	I	Crickets (Egg parasitoid)	Popovici (2005)
<i>Gryon leptocorisae</i> (Howard, 1885)	A	parasitic/ predator	North America	Unknown	DK, FR, IT	I	<i>Stenocoris</i> (Egg parasitoid)	Mineo (1981)
<i>Telenomus busseolae</i> Gahan, 1922	A	parasitic/ predator	Africa	Unknown, IT	IT	I	Stem borers (Egg parasitoid)	Conti and Bin (2000), Gullu and Simsek (1995), Laudonia et al. (1991)

Families <i>Species</i>	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
Signiphoridae								
<i>Chartocerus niger</i> (Ashmead, 1900)	A	parasitic/ predator	North America	Unknown	ES, FR, IT	U	Scale insects (Hyperparasitoid via Encyrtids)	Woolley (1988)
Siricidae								
<i>Sirex areolatus</i> (Cresson, 1867)	A	phyto- phagous	North America	1995, GB	GB, IT	G3	Conifers	Viitasaari and Midtgaard (1989)
<i>Sirex cyaneus cyaneus</i> Fabricius, 1781	A	phyto- phagous	North America	1885, FR	BE, CH, DE, DK, FR, GB, GR, HU, IE, IL, IT, LU, NL, PT, SE, SK	G3, I2	Conifer trunks (mainly <i>Abies</i>)	Hayes (1982), Hellrigl (1984), Kink (1974), Midtgaard (1986), Schwarz (1994), Viitasaari and Midtgaard (1989)
<i>Tremex columba</i> (Linnaeus, 1763)	A	phyto- phagous	North America	1957, GB	GB	G, I2	<i>Fagus, Quercus, Acer,</i> <i>Betula</i> , etc	Winter (1988)
<i>Urocerus albicornis</i> (Fabricius, 1781)	A	phyto- phagous	North America	1991, GB	GB, IS, NL, PL	G3	Conifers	Witmond (2001)
<i>Urocerus californicus</i> Norton, 1869	A	phyto- phagous	North America	1944, GB	GB	G3	Conifers	Fitton et al. (1978)
Sphecidae								
<i>Isodontia mexicana</i> (Saussure, 1867)	A	parasitic/ predator	North America	1960, FR	AT, CH, DE, ES, FR, FR-COR, HR, IT, SI	E, X25	Crickets in grasslands (predatory)	Pagliano et al. (2000), Scaramozzino and Pagliano (1987)
<i>Sceliphron cementarium</i> (Drury, 1773)	A	parasitic/ predator	North America	1945, FR	AT, BE, DE, ES- CAN, FR, FR- COR, HR, IT, LU, PT-MAD, PT, UA	C3, X25	Adults nectar at flowers and mud nests are built in sheltered locations such as garages and underneath bridges	Bitsch et al. (1997), Pagliano et al. (2000)

Families <i>Species</i>	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Sceliphron curvatum</i> (Smith, 1870)	A	parasitic/ predator	Asia- Temperate	1979, AT	AT, BG, CH, CZ, DE, FR, FR-COR, HR, HU, IT, IT- SAR, IT-SIC, RS, SI, UA,	C3, X25	Adults nectar at flowers and mud nests are built in Sheltered locations such as garages and underneath bridges, predatory	Bitsch and Barbier (2006), Bogusch et al. (2005), Castro (2007), Cetkovic et al. (2004), Ebmer (1995), Gonseth et al. (2001), Rahola (2005), van der Vecht (1984)
<i>Sceliphron deforme</i> (Smith, 1856)	A	parasitic/ predator	Asia- Temperate	1998, ME	FR, ME	C3, X25	Adults nectar at flowers and mud nests are built in sheltered locations such as garages and underneath bridges, predatory	Cetkovic et al. (2004)
Tenthredinidae								
<i>Nematus (Pteronidea)</i> <i>tibialis</i> Newman, 1837	A	phyto- phagous	North America	1825, DE	AT, BE, BG, CH, CZ, DE, ES, FI, FR, GB, GR, HR, HU, IT, LT, MD, NL, PL, RO, SK, UA	G, I2	<i>Robinia</i>	Ermolenko and Sem'yanov (1981), Markó et al. (2006)
<i>Pachynematus</i> (<i>Larinematus</i>) <i>itoi</i> Okutani, 1955	A	phyto- phagous	Asia- Temperate	1971, AT	AT	G3, G5	<i>Larix</i>	Pschorn-Walcher and Zinnert (1971)
Torymidae								
<i>Eridontomerus</i> <i>isosomatis</i> (Riley, 1882)	A	parasitic/ predator	North America	1912, HU	CZ, HU, SK, UA	I	<i>Tetramesa</i> on Poaceae	Boucek (1968), Erdős (1954), Grissell (1995)
<i>Megastigmus aculeatus</i> <i>nigroflavus</i> Hoffmeyer, 1929	A	phyto- phagous	North America	1966, DE	BG, DE, FR, RU	F, I2, E5	<i>Rosa</i>	Roques and Skrzypczynska (2003)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Megastigmus atedius</i> Walker, 1851	A	phyto- phagous	North America	1954, DE	CZ, DE, DK, FR, GB, PL, RU	G3, G4, X11	<i>Picea, Pinus strobus</i>	Jensen and Ochsner (1999), Roques and Skrzypczynska (2003)
<i>Megastigmus borriesi</i> Crosby, 1913	A	phyto- phagous	Asia- Temperate	1969, FIN- ALA	DK, FI-ALA, RU	X11	<i>Abies</i>	Annala (1970), Jensen and Ochsner (1999), Ochsner (1998)
<i>Megastigmus lasiocarpae</i> Crosby, 1913	A	phyto- phagous	North America	1969, FIN- ALA	FIN-ALA		<i>Abies</i>	Annala (1970)
<i>Megastigmus milleri</i> Milliron, 1949	A	phyto- phagous	North America	1952, GB	DK, FR, NL, GB	G3, G4, X11	<i>Abies</i>	Jensen and Ochsner (1999), Roques and Skrzypczynska (2003)
<i>Megastigmus</i> <i>nigrovariegatus</i> Ashmead, 1890	A	phyto- phagous	North America	1987, FR	FR	E5	<i>Rosa</i>	Roques and Skrzypczynska (2003)
<i>Megastigmus pinsapinis</i> Hoffmeyer, 1931	A	phyto- phagous	Africa	1858, FR	ES, FR, IT	G3, G4, X11	<i>Cedrus</i>	Pintureau et al. (1991), Roques and Skrzypczynska (2003), Skrzypczynska and Mazurkiewicz (2002)
<i>Megastigmus pinus</i> Parfitt, 1857	A	phyto- phagous	North America	1931, GB	BE, CZ, DE, DK, FR, GB, IE, NL, SE	G3, G4, X11	<i>Abies</i>	Jensen and Ochsner (1999), Roques and Skrzypczynska (2003)
<i>Megastigmus rafni</i> Hoffmeyer, 1929	A	phyto- phagous	North America	1930, GB	BE, DE, DK, FR, GB, NL	G3, G4, X11	<i>Abies</i>	Jensen and Ochsner (1999), Roques and Skrzypczynska (2003)
<i>Megastigmus</i> <i>schimitscheki</i> Novitzky, 1954	A	phyto- phagous	Asia- Temperate	1990, FR	FR	G3, G4	<i>Cedrus</i>	Roques and Skrzypczynska (2003)
<i>Megastigmus specularis</i> Walley, 1932	A	phyto- phagous	North America	1920, FIN- ALA	DK, FI, FR, RU, SE	G3, G4, X11	<i>Abies</i>	Jensen and Ochsner (1999), Roques and Skrzypczynska (2003)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Megastigmus spermatrophus</i> Wachtl, 1893	A	phyto- phagous	North America	1896, GB	AT, BE, CH, CZ, DE, DK, EE, ES, FI, FR, GB, HU, IE, IT, ME, NL, NO, PL, PT, RO, RS, RU, SE, SK, UA	G3, G4, X11	<i>Pseudotsuga</i>	Mailleux et al. (2008), Roques and Skrzypczynska (2003)
<i>Megastigmus transvaalensis</i> (Hussey, 1956)	A	phyto- phagous	Africa	1962, ES- CAN	ES, ES-CAN, FR, PT	I2, G5	<i>Schinus</i>	Grissell and Prinsloo (2001), Scheffer and Grissell (2003)
Trichogrammatidae								
<i>Megaphragma myrmaripenne</i> Timberlake, 1924	A	parasitic/ predator	Asia- Tropical	1995, IT	IT-SIC, IT	I	Thrips (Egg parasitoid)	Sinacori et al. (1999), Viggiani and Bernardo (1996)
<i>Oligosita distincta</i> (Silvestri, 1915)	A	parasitic/ predator	Africa	1939, FR	FR, SE	I	Leafhoppers (Egg parasitoid)	Hedqvist (2003), Nowicki (1940)
<i>Oligosita sanguinea</i> (Girault, 1911)	A	parasitic/ predator	North America	1949, HU	HU	I	Cicadellid in wheat (Egg parasitoid)	Erdős (1956)
<i>Trichogramma achaeae</i> Nagaraja & Nagarkatti, 1970	A	parasitic/ predator	Asia	1987, FR	FR	I	Stem-borer (Egg parasitoid)	Voegelé et al. (1988)
<i>Trichogramma chilonis</i> Ishii, 1941	A	parasitic/ predator	Asia	1985, DE	DE, RO	I1	Cabbage moths, cotton bollworm, maize pyralid, armyworm	Glas and Hassan (1985)
<i>Trichogramma dendrolimi</i> Matsumura, 1926	A	parasitic/ predator	Asia	1978, BG	AT, BE, BY, BG, DE, FR, GR, HU, IT, LT, LV, MD, RO, RU, UA	I, G	Lepidoptera, e.g. <i>Epichoristodes acerbella</i>	Babi et al. (1984), Wetzell Dickler (1994)

Families Species	Status	Regime	Native range	First Record in Europe	Invaded countries	Habitat	Host	References
<i>Trichogramma minutum</i> Riley, 1871	C	parasitic/ predator	Crypto- genic	1957, CZ	CZ, DE, ES, FR, GB, GR, IT	I1, G	Maize borer and forest moths	CIBC (1976), Hering (1975), Thompson (1958), Viggiani and Laudonia (1989)
<i>Trichogramma perkinsi</i> Girault, 1912	A	parasitic/ predator	Asia	1984, FR	FR	I1	Lepidopteran pests (highly polyphagous)	Voegelé et al. (1988)
<i>Trichogramma pretiosum</i> Riley, 1879	C	parasitic/ predator	Crypto- genic	1975, GR	ES, GR, YU	I1	Cotton leafworm	Danon (1989), Stavraki (1976)
<i>Uscana johnstoni</i> (Waterston, 1926)	A	parasitic/ predator	Africa	1970, RO	RO	J	Bruchinae	Botoc (1971)
<i>Uscana semifumipennis</i> Girault, 1911	A	parasitic/ predator	North America	1963, HU	HU	J	Bruchinae	Reichart (1964)
Vespidae								
<i>Vespa velutina nigrithorax</i> du Buysson, 1905	A	parasitic/ predator	Asia- Temperate	2004, FR	FR	G	Woodland	Haxaire et al. (2006), Villemant et al. (2006)

Table 12.2. Hymenoptera species alien *in* Europe. List and characteristics. Country codes abbreviations refer to ISO 3166 (see appendix I). Habitat abbreviations refer to EUNIS (see appendix II). Last update 01/03/2010.

Families <i>Species</i>	Status	Regime	Native range	First Record	Invaded countries	Habitat	Host	References
Aphelinidae								
<i>Eretmocerus mundus</i> Mercet, 1931	E	parasitic/ predator	Medi- terranean region	Unknown	DE, NL	J100	Cotton whitefly, <i>Bemisia, Trialeurodes</i>	Drost et al. (1996)
Apidae								
<i>Apis mellifera carnica</i> (Pollmann, 1879)	E	phyto- phagous	Europe	2001, DK	DK, PT	I	Pollinator of various cultivated plants	Pedersen (1996)
<i>Apis mellifera ligustica</i> (Spinola, 1806)	E	phyto- phagous	Europe	1987, DK	DK, PT	I	Pollinator of various cultivated plants	Pedersen (1996)
<i>Apis mellifera mellifera</i> Linnaeus, 1758	E	phyto- phagous	Europe	2005, AL	AL, GL	I	Pollinator of various cultivated plants	
<i>Bombus hortorum</i> (Linnaeus, 1761)	E	phyto- phagous	Europe	1959, IS	IS	I	Pollinator of various cultivated plants	Prys-Jones et al. (1981)
<i>Bombus lucorum</i> (Linnaeus, 1761)	E	phyto- phagous	Europe	1979, IS	IS	I	Pollinator of various cultivated plants	Prys-Jones et al. (1981)
Argidae								
<i>Arge berberidis</i> Schrank, 1802	E	phyto- phagous	Europe	2000, GB	GB	I2	<i>Berberis</i>	Fitton et al. (1978)
Bethylidae								
<i>Sclerodermus domesticus</i> Klug, 1809	E	parasitic/ predator	Europe	2005 PT- AZO	PT-AZO, GB	J	Insects in wood furnitures; cause dermatitis in human by stings	Fitton et al. (1978)
Blasticotomidae								
<i>Blasticotoma fliceti</i> Klug 1834	E	phyto- phagous	Europe	1905, GB		I2, D2	<i>Athyrium</i> ferns (Leaf miner)	Schedl (1974)

Families <i>Species</i>	Status	Regime	Native range	First Record	Invaded countries	Habitat	Host	References
Chrysididae								
<i>Chrysis marginata</i> Mocsary, 1889	E	parasitic/ predator	Asia- Temperate	1915, HU	AT, HR, HU, IT	F6	Bees	Pagliano et al. (2000)
Cynipidae								
<i>Andricus corruptrix</i> (Schlechtendal, 1870)	E	phyto- phagous	Europe	1735, GB	GB, IE	G	<i>Quercus</i>	Fitton et al. (1978)
<i>Andricus grossulariae</i> Giraud, 1859	E	phyto- phagous	Europe	Unknown, GB	GB	G,I2	<i>Quercus</i>	Fitton et al. (1978)
<i>Andricus kollari</i> (Hartig 1843)	E	phyto- phagous	Europe	1735, GB	GB	G	<i>Quercus</i>	Fitton et al. (1978)
<i>Andricus lignicola</i> (Hartig, 1840)	E	phyto- phagous	Europe	1735, GB	GB	I2	<i>Quercus</i>	Fitton et al. (1978)
<i>Andricus quercuscalicis</i> (Burgsdorff 1783)	E	phyto- phagous	Europe	Unknown	GB, IE	I2	<i>Quercus</i>	Fitton et al. (1978)
<i>Apbelonyx cerricola</i> (Giraud 1859)	E	phyto- phagous	Europe	1993, GB	GB	G	<i>Quercus</i>	Fitton et al. (1978)
Diprionidae								
<i>Diprion pini</i> (Linnaeus, 1758)	E	phyto- phagous	Europe	Unknown, IE	IE	G3	<i>Pinus</i>	Fitton et al. (1978)
<i>Diprion similis</i> (Hartig, 1836)	E	phyto- phagous	Europe	Unknown, GB	GB	G3	<i>Pinus</i>	Fitton et al. (1978)
<i>Gilpinia hercyniae</i> (Hartig, 1837)	E	phyto- phagous	Europe	Unknown, GB	GB	G3	<i>Picea</i>	Fitton et al. (1978)
<i>Gilpinia virens</i> (Klug, 1812)	E	phyto- phagous	Europe	Unknown, GB	GB	G3	<i>Pinus</i>	Fitton et al. (1978)
<i>Neodiprion sertifer</i> (Geoffroy, 1785)	E	phyto- phagous	Europe	Unknown	IE, GB	G3	<i>Pinus</i>	Fitton et al. (1978)

Families <i>Species</i>	Status	Regime	Native range	First Record	Invaded countries	Habitat	Host	References
Encyrtidae								
<i>Ageniaspis fuscicollis</i> (Dalman, 1920)	E	parasitic/ predator	Medi- terranean region	1735, GB	AU, BE, BY, CH, CZ, DE, DK, EE, ES-CAN, FI, GB, HU, IS, IE, LT, LV, LU, MD, NL, NO, NO-SVA, PL, PT-AZO, PT-MAD, RO, RU, SE, SK, UA	I	<i>Prays oleae</i> on <i>Citrus</i> and yponomeutids	Koscielska (1963), Kuhlmann (1994), Nénon (1978)
<i>Anagyrus pseudococci</i> (Girault, 1915)	E	parasitic/ predator	Medi- terranean region	1994, PT	CZ, ES-CAN, FR, HR, IL, MD, ME, NL, PT, RU, SE, YU	J100	Pseudococci on <i>Citrus</i> and many crops	Tingle and Copland (1988)
Eulophidae								
<i>Thripastichus gentilei</i> (Del Guercio, 1931)	E	parasitic/ predator	Europe	1930, IT	DE, FR, IT, YU	I	Thrips	Del Guercio (1931), Domenichini et al. (1964), Herting (1971)
Eurytomidae								
<i>Bruchophagus robiniae</i> Zerova, 1970	E	parasitic/ predator	Europe	1969, UA	BG, UA,	G5	Seed feeder on <i>Robinia pseudoacacia</i>	Stojanova (1997), Zerova (1970)
Formicidae								
<i>Aphaenogaster senilis</i> Mayr, 1853	E	parasitic/ predator	Medi- terranean region	2005, PT- AZO	PT-AZO,	U	Natural habitat, garrigue	Wetterer et al. (2004)
<i>Crematogaster scutellaris</i> (Olivier, 1792)	E	parasitic/ predator	Europe	Unknown	DE, GB	J	Trees	Bernard (1968)
<i>Lasius alienus</i> (Foerster, 1850)	E	parasitic/ predator	Europe	Unknown, IE	IE	E1, H5	Warm, dry, stony environnements	Collingwood (1958)
<i>Lasius flavus</i> (Fabricius, 1781)	E	parasitic/ predator	Europe	Unknown, IE	IE	E1, E5	Meadows, dry grasslands, Forest borders	Collingwood (1958)

Families <i>Species</i>	Status	Regime	Native range	First Record	Invaded countries	Habitat	Host	References
<i>Lasius fuliginosus</i> (Latreille, 1798)	E	parasitic/ predator	Europe	Unknown, IE	IE	E5	Trunks and stumps, forest borders	Edwards (1997)
<i>Ponera coarctata</i> (Latreille, 1802)	E	parasitic/ predator	Medi- terranean region	Unknown	BE, BG, DE, GB, HU, PL, RU	G	Dry and warm areas	Geiter et al. (2002)
<i>Tetramorium caldarium</i> (Roger, 1857)	E	parasitic/ predator	Europe	1847, PT- MAD	ES-CAN, GB, PT-AZO, PT-MAD	G, J1, I2	Gardens, urban, arid sites	Wetterer et al. (2004)
Megachilidae								
<i>Megachile rotundata</i> (Fabricius, 1787)	A	phyto- phagous	Europe	Unknown	RU	I	Pollinator of alfalfa	Pesenko and Astafurova (2003)
Pamphiliidae								
<i>Acanthobyda erythrocephala</i> L. 1758	E	parasitic/ predator	Europe	Unknown	GB	G3	<i>Pinus</i>	Fitton et al. (1978)
<i>Acanthobyda (Itycorsia) laricis</i> (Giraud, 1861)	E	phyto- phagous	Europe	1986, NL	BE, NL	G3	<i>Larix</i>	Magis (1988)
<i>Cephalcia abietis</i> (Linnaeus, 1758)	E	phyto- phagous	Europe	1986, NL	NL	G3	<i>Picea</i>	van Achterberg and van Aartsen (1986)
<i>Cephalcia alpina</i> (Klug, 1808)	E	phyto- phagous	Europe	1988, BE	BE, LU	G3	<i>Picea</i>	Magis (1988)
<i>Cephalcia erythrogaster</i> (Hartig, 1837)	E	phyto- phagous	Europe	1986, NL	BE, NL	G3	<i>Picea</i>	Magis (1988)
<i>Cephalcia lariciphila</i> (Wachtl, 1898)	E	phyto- phagous	Europe	1941, NL	BE, DK, GB, LT, NL, SE, UA	G3	<i>Larix</i>	Billany and Brown (1980)
Pteromalidae								
<i>Lariophagus distinguendus</i> (Förster, 1841)	E	parasitic/ predator	Europe	2005, PT- AZO	PT-AZO	J	Stored products weevils, <i>Sitophilus</i> , in grain	
Siricidae								
<i>Sirex juvenis</i> (Linnaeus, 1758)	E	phyto- phagous	Europe	Unknown, GB	GB	G3	Conifers	Fitton et al. (1978)

Families Species	Status	Regime	Native range	First Record	Invaded countries	Habitat	Host	References
<i>Sirex noctilio</i> Fabricius, 1773	E	phyto-phagous	Europe	Unknown	GB	G3	<i>Pinus, Abies, Larix</i>	Fitton et al. (1978)
<i>Urocerus gigas</i> (Linné, 1758)	E	phyto-phagous	Europe	Unknown, GB	GB	G3	Conifers	Fitton et al. (1978)
<i>Xeris spectrum</i> (Linnaeus, 1758)	E	phyto-phagous	Europe	1951, GB	GB	G3	Conifers	Fitton et al. (1978)
Tenthredinidae								
<i>Ametastegia</i> (<i>Protomphytus</i>) <i>pallipes</i> (Spinola, 1808)	E	phyto-phagous	Europe	Unknown, GB	GB	I2	<i>Viola</i>	Fitton et al. (1978)
<i>Anoplonyx destructor</i> Benson, 1952	E	phyto-phagous	Europe	1953, GB	DK, EE, GB, HU, IE, SE	G3, I2	<i>Larix</i>	Leston (1988), Piekarczyk and Wright (1988), Speight (1979)
<i>Athalia rosae</i> (Linnaeus, 1758)	E	phyto-phagous	Europe	Unknown, GB	GB	I, J	<i>Brassica, Sinapis</i>	Fitton et al. (1978)
<i>Hoplocampa brevis</i> (Klug, 1816)	E	phyto-phagous	Europe	1935, GB	GB	I2, G5	<i>Pyrus</i>	Fitton et al. (1978)
<i>Nematus</i> (<i>Pteronidea</i>) <i>spiraee</i> Zaddach, 1883	E	phyto-phagous	Europe	1824, GB	GB	I2	<i>Spiraea, Aruncus</i>	Fitton et al. (1978)
<i>Pachynematus</i> (<i>Epicenematus</i>) <i>montanus</i> (Zaddach, 1883)	E	phyto-phagous	Europe	Unknown, GB	GB	G3	<i>Picea</i>	Fitton et al. (1978)
<i>Pachynematus</i> (<i>Larinematus</i>) <i>imperfectus</i> (Zaddach, 1876)	E	phyto-phagous	Europe	1915, DK	BE, DK, GB, HU, LV, NL	G3, G5	<i>Larix</i>	Fitton et al. (1978)
<i>Pachynematus</i> (<i>Pikonema</i>) <i>scutellatus</i> (Hartig, 1837)	E	phyto-phagous	Europe	Unknown	GB, IE	G3	<i>Picea</i>	Fitton et al. (1978)

Families Species	Status	Regime	Native range	First Record	Invaded countries	Habitat	Host	References
<i>Pachyprotasis variegata</i> (Fallen, 1808)	E	phyto- phagous	Europe	Unknown, GB	GB	I, J	<i>Digitalis, Plantago</i>	Fitton et al. (1978)
<i>Phymatocera aterrima</i> (Klug, 1816)	E	phyto- phagous	Europe	1846, GB	GB	I2, G1	<i>Polygonatum</i>	Fitton et al. (1978)
<i>Pristiphora</i> (<i>Lygaeonematus</i>) <i>abietina</i> (Christ, 1791)	E	phyto- phagous	Europe	Unknown, IE	IE	G3	<i>Picea</i>	
<i>Pristiphora</i> (<i>Lygaeonematus</i>) <i>compressa</i> (Hartig, 1837)	E	phyto- phagous	Europe	Unknown, GB	GB	G3	<i>Picea</i>	Fitton et al. (1978)
<i>Pristiphora</i> (<i>Lygaeonematus</i>) <i>erichsonii</i> (Hartig, 1837)	E	phyto- phagous	Europe	1906, GB	DK, EE, ES, GB, IE, LV, NL, NO, SE	G3, I2, FB	<i>Larix</i>	Fitton et al. (1978)
<i>Pristiphora</i> (<i>Lygaeonematus</i>) <i>glauca</i> Benson, 1954	E	phyto- phagous	Europe	1954, GB	GB	G3	<i>Larix</i>	Fitton et al. (1978)
<i>Pristiphora</i> (<i>Lygaeonematus</i>) <i>saxesenii</i> (Hartig, 1837)	E	phyto- phagous	Europe	Unknown, GB	GB	G3	<i>Picea</i>	Fitton et al. (1978)
<i>Pristiphora</i> (<i>Lygaeonematus</i>) <i>subarctica</i> (Forsslund, 1936)	E	phyto- phagous	Europe	1949, GB	GB	G3	<i>Picea</i>	Fitton et al. (1978)
<i>Pristiphora</i> (<i>Lygaeonematus</i>) <i>wesmaeli</i> (Tischbein, 1853)	E	phyto- phagous	Europe	1915, DK	BE, BY, DK, EE, GB, NL, SE, GB	G3, I2, FB	<i>Larix</i>	Fitton et al. (1978)
<i>Pristiphora</i> (<i>Oligonematus</i>) <i>laricis</i> (Hartig, 1837)	E	phyto- phagous	Europe	1915, DK	BE, DK, EE, ES, GB, HU, IE, ME, NL, RS, SE, UA	G3, FB, I2	<i>Larix</i>	Fitton et al. (1978)

Families Species	Status	Regime	Native range	First Record	Invaded countries	Habitat	Host	References
<i>Pristiphora (Pristiphora) angulata</i> Lindqvist, 1974	E	phyto-phagous	Europe	1995, FI	EE, FI	FA, I2	<i>Spiraea chamaedryfolia</i>	Lindqvist (1974)
<i>Pristiphora (Pristiphora) leucopus</i> (Hellén, 1948)	E	phyto-phagous	Europe	2004, GB	GB	G3, G4	<i>Tilia</i>	Firton et al. (1978)
<i>Pristiphora (Pristiphora) thalictri</i> (Kriechbaumer, 1884)	E	phyto-phagous	Europe	1946, GB	GB	I2	<i>Thalictrum</i>	Firton et al. (1978)
<i>Pristiphora (Sharliphora) amphibola</i> (Förster, 1854)	E	phyto-phagous	Europe	Unknown, GB	GB	G3	<i>Picea</i>	Firton et al. (1978)
<i>Pristiphora (Sharliphora) nigella</i> Förster, 1854)	E	phyto-phagous	Europe	Unknown, GB	GB	G3	<i>Picea</i>	Firton et al. (1978)
Torymidae								
<i>Megastigmus pictus</i> (Förster, 1841)	E	phyto-phagous	Europe	1879, GB	IE, GB	G3, G4,X11	<i>Larix</i>	Roques and Skrzypczynska (2003)
<i>Megastigmus suspectus</i> Borries, 1895	E	phyto-phagous	Europe	1943, IE	IE, GB	G3, G4,X11	<i>Abies</i>	Roques and Skrzypczynska (2003)
<i>Megastigmus wachtli</i> Seitner, 1916	E	phyto-phagous	Asia-Temperate	1915, SI	AL, BA, BG, ES, FR-COR, FR, GR, HR, IL, IT, ME, MT, PT, RO, RS, SI	G5, I2, X15	<i>Cupressus</i>	Rasplus et al. (2000), Roques and Skrzypczynska (2003)
Trichogrammatidae								
<i>Trichogramma brassicae</i> Bezdenko, 1968	E	parasitic/predator	Europe	1996, DE	AT, BG, CH, DE, ES, FR, NL, RO	I1	<i>Ostrinia</i> corn borer but highly polyphagous	Pintureau (2008)
Vespidae								
<i>Vespula germanica</i> (Fabricius, 1793)	E	parasitic/predator	Europe	Unknown, IS	IS	G3, G4	Woodland	Olafsson (1979)
<i>Vespula vulgaris</i> (Linné, 1758)	E	parasitic/predator	Eurasia	Unknown	FÖ, IS	H, X25	Woodland	Olafsson (1979)

Table 12.3. Number of alien Hymenoptera per European countries.

Countries	N	Countries	N
Italy mainland	144	Finland mainland	13
France mainland	111	Italy Sardinia	13
Spain mainland	90	Montenegro	11
Israel	82	Spain Balearic islands	11
Germany mainland	80	Croatia	10
Greece mainland	50	Norway mainland	10
Great Britain	45	Ireland	10
Czech Republic	41	Malta	8
Netherlands	40	Moldova	8
Denmark	36	Slovenia	8
Italy Sicily	36	Lithuania	7
Portugal mainland	35	Portugal Azores	7
Russia	33	Greece Crete	6
Belgium	32	Estonia	5
Austria	31	Luxemburg	4
Hungary	30	Greenland	3
Spain Canary islands	30	Iceland	2
Switzerland	30	Belarus	2
Poland	26	FinlandAland	2
Sweden	23	Greece South Aegean Isl	2
Cyprus	23	Latvia	1
Bulgaria	22	Bosnia	1
Ukraine	22	Feroe Islands	1
France Corsica	19	Greece North Aegean Isl	1
Romania	18	Norway Svalbard	1
Portugal Madeira	18	Andorra	0
Slovakia	18	FYRM Macedonia	0
Albania	17	Greece Ionian islands	0
Former Yougoslavia	14	Lichtenstein	0
Serbia	14		